

BAYOU LAFOURCHE AND
LAFOURCHE-JUMP WATERWAY, LA.

LETTER

FROM

THE SECRETARY OF THE ARMY

TRANSMITTING

A LETTER FROM THE CHIEF OF ENGINEERS, DEPARTMENT OF THE ARMY, DATED FEBRUARY 2, 1959, SUBMITTING A REPORT, TOGETHER WITH ACCOMPANYING PAPERS AND AN ILLUSTRATION, ON A SURVEY OF BAYOU LAFOURCHE AND LAFOURCHE-JUMP WATERWAY, LA., MADE PURSUANT TO SEVERAL CONGRESSIONAL AUTHORIZATIONS LISTED IN THE REPORT



APRIL 10, 1959.—Referred to the Committee on Public Works and ordered to be printed with one illustration

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LETTER OF TRANSMITTAL

DEPARTMENT OF THE ARMY,
Washington, D.C., April 2, 1959.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

DEAR MR. SPEAKER: I am transmitting herewith a favorable report dated February 2, 1959, from the Chief of Engineers, Department of the Army, together with accompanying papers and an illustration, on a survey of Bayou Lafourche and Lafourche-Jump Waterway, La., made pursuant to several congressional authorizations listed in the report.

In accordance with section 1 of Public Law 534, 78th Congress, section 1 of Public Law 14, 79th Congress, and Public Law 732, 79th Congress, the views of the State of Louisiana and the Department of the Interior are set forth in the enclosed communications, together with the reply of the Chief of Engineers to the Secretary of the Interior. The views of the Secretary of Commerce are also enclosed.

The Bureau of the Budget advises that there is no objection to the submission of the proposed report to the Congress; however, it states that no commitment can be made at this time as to when any estimate of appropriation would be submitted for construction of the project modification, if authorized by the Congress, since this would be governed by the President's budgetary objectives as determined by the then prevailing fiscal situation. A copy of the letter from the Bureau of the Budget is inclosed.

Sincerely yours,

WILBER M. BRUCKER,
Secretary of the Army.

COMMENTS OF THE BUREAU OF THE BUDGET

EXECUTIVE OFFICE OF THE PRESIDENT,
BUREAU OF THE BUDGET,
Washington, D.C., March 18, 1959.

The Honorable the SECRETARY OF THE ARMY.

MY DEAR MR. SECRETARY: Assistant Secretary Short's letter of February 26, 1959, submitted the proposed report of the Chief of Engineers on Bayou Lafourche and Lafourche-Jump Waterway, La., made pursuant to several congressional authorizations listed in the report.

The Chief of Engineers recommends, subject to specific requirements of local cooperation, modification of the existing project for Bayou Lafourche, La., to provide for dredging an auxiliary channel 12 feet deep and 125 feet wide from the Intracoastal Waterway at mile 37.2 west of Harvey lock, generally parallel to and west of Bayou Lafourche below the highway bridge at Leeville at mile 12, thence in the bayou to the 12-foot depth in the Gulf of Mexico; dredging a channel 9 feet deep and 100 feet wide in Bayou Lafourche from Leeville to the vicinity of the lower limits of Golden Meadow; restoring and extending the existing jetties at Belle Pass from the 6-foot to the 12-foot depth, if found advisable in order to reduce maintenance dredging in the Gulf of Mexico; and dredging a channel 12 feet deep and 125 feet wide from Bayou Lafourche at Leeville through the Southwest Louisiana Canal to and through Bayou Rigaud. The cost of this work to the United States is estimated to be \$4,664,000 for construction and \$68,500 for annual maintenance in addition to that now required.

I am authorized by the Director of the Bureau of the Budget to advise you that there would be no objection to the submission of the proposed report to the Congress. No commitment, however, can be made at this time as to when any estimate of appropriation would be submitted for construction of the project modification, if authorized by the Congress since this would be governed by the President's budgetary objectives as determined by the then prevailing fiscal situation.

Sincerely yours,

CARL H. SCHWARTZ, Jr.,
Chief, Resources and Civil Works Division.

COMMENTS OF THE STATE OF LOUISIANA

STATE OF LOUISIANA,
DEPARTMENT OF PUBLIC WORKS,
Baton Rouge, September 2, 1958.

Maj. Gen. E. C. ITSCHNER,
Chief of Engineers,
Department of the Army,
Washington, D.C.

DEAR GENERAL ITSCHNER: Reference is made to your report entitled "Bayou Lafourche and Lafourche-Jump Waterway, La." which was submitted to us June 20, 1958, for comments and recommendations.

This report has been reviewed by the department of public works and we concur in the recommendations made therein. In fact, we believe this is one of the most worthwhile navigation projects in Louisiana.

In addition to our comments you requested that we furnish the views of the agency in Louisiana responsible for fish and wildlife. Accordingly, there is enclosed a letter from Mr. F. L. Clement, director of wildlife and fisheries commission to the director of the department of public works giving the views of that agency on this report.

We wish to compliment the Corps of Engineers on the preparation of this report and express the hope that it may soon be transmitted to Congress for early authorization.

Sincerely yours,

LORRIS M. WIMBERLY, Director.

STATE OF LOUISIANA,
WILD LIFE AND FISHERIES COMMISSION,
New Orleans, August 21, 1958.

Mr. LORRIS M. WIMBERLY,
Director, Louisiana Department of Public Works,
Baton Rouge, La.

DEAR MR. WIMBERLY: Reference is made to your letter of July 7 and our letter of July 15, 1958, concerning the proposed survey report on Bayou Lafourche and Lafourche Jump Waterway, La., which was referred to us for review and comments.

For purposes of commenting on this report, we have arbitrarily considered separately the various segments of the proposed project. Accordingly, potential benefits and damages have been indicated for the appropriate segments which are given below. Also, this reaffirms fish and wildlife reports on this subject.

Segment A. From the Intracoastal Waterway down Grand Bayou Blue to Bayou Lafourche

1. The routes selected will traverse just a few oysterbeds; however, these beds should be considered as a total loss. Thus, the owners should be compensated for these losses.

2. The effect of the proposed project on the ecology of the adjacent bays and bayous to the south and west of this route will largely depend upon the disposition of spoil and the admittance of freshwater into the adjacent areas. If the spoil is so placed as to allow large volumes of freshwater to filter into the area south and west, such as Bays Canard Gris, Bay Point Fine, Bay Chinois, Bay Roseaux, Lake Raccourci and Little Lake (to mention some), it is probable that the area will be benefited from additional freshwater. On the other hand, if the supply of freshwater now introduced to the area from Grand Bayou Blue is restricted by the disposition of spoil and/or changes in current velocities and/or volumes of fresh water, the adjacent areas to the south and west will be adversely affected.

3. Numerous oyster leases occur in Little Lake and Lake Raccourci which lie in close proximity to the proposed route through Grand Bayou Blue. Extensive dredging in Grand Bayou Blue could conceivably cause silting and damage to the oyster leases in these areas. It is recommended that all dredging in this immediate area be carried

out with a dragline and bucket, and that the spoil be handled in a manner to minimize excessive silting. Furthermore, it is recommended that the contracting officer and the contractor consult with authorities of the Louisiana Wild Life and Fisheries Commission concerning specific details of the project when final drawings and specifications are being prepared and during construction to minimize construction damages to adjacent oyster growing areas.

4. This segment of the project traverses a marsh which is valuable for muskrat production. During good years the manager estimates the gross take of rats at \$100,000. In a similar manner, this area provides good waterfowl hunting opportunities. An important consideration in the construction of a canal or channel through this marsh, would be to maintain previously existing water levels and salinities, with the possibility of decreasing the salinities to some extent. Generally speaking, similar considerations and practices as suggested for oyster areas will be adequate.

Segment B. Bayou Lafourche

The opening of Bayou Lafourche by dredging should benefit lower areas and distributaries by carrying more fresh water from above to the higher salinity marshes and small bays.

Segment C. Bayou Lafourche to Grand Isle

1. This segment of the project from Bayou Lafourche at Leeville through Southwest Louisiana Canal, to and through Bayou Rigaud to Grand Isle, traverses an area sparsely used for oyster culture. Some six oyster leases in Bayou Thunder could be drastically affected by silting and ecological changes. These six leases and two other leases lying in the direct path of the project in Bayou Rigaud should, in all probability, be considered a total loss for which compensation should be provided.

2. The principal portion of the project which could conceivably affect the ecology of considerable area in Caminada Bay and Bay des Ilettes involves the handling and disposition of spoil in lower Caminada Bay where it joins Caminada Pass and enters the open gulf. If this area is closed off by spoil or if the water entering Caminada Bay through Caminada Pass is drastically reduced, then some 50 or more oyster leases to the north of the area may be adversely affected because of changes in current, velocity, salinity and other ecological factors.

3. This commission now has under lease approximately 30,000 acres known as the Wisner Public Shooting Ground. It is located southwest of the Southwest Louisiana Canal on the north, Caminada Bay on the east, Gulf of Mexico on the south, and virtually parallel to and east of Bayou Lafourche on the west. This area is scheduled for initial development operations on or about September 1958.

Developments will consist of two wooden water control structures on the south side of the Southwest Louisiana Canal between Bayou Manuel and South Lake and numerous earthen fills, designed primarily for the purpose of water stabilization. To avoid damages to this development work and also to provide benefits to wildlife in this area, the canal should be constructed with a dragline and bucket dredge whereby the spoil is carefully placed within the right-of-way area. Any damages to existing developments which are newly installed should be compensated for in kind. In this specific case, it is

recommended that a spoil levee be placed on the south side of the Southwest Louisiana Canal, that the spoil be placed on the west side of the north-south alinement adjacent to the Wisner area and that all water areas on this line be completely blocked. Furthermore, that any spoil derived from Bayou Lafourche be placed on the east side from Leeville to the gulf and that Bayou Manuel be left open to provide access for hunters and fishermen. The extent of this commission's development program will be \$250,000 over the next 10 years. Thus, any construction work by the corps as the planning and contracting agency, or by the contractors, should be carefully coordinated in all details of planning, supervision, and actual project construction, with the authorities of this commission.

Segment D. Barataria Pass to the Jump

The construction or improvement of the sections of the project from the Intracoastal Waterway through Grand Bayou Blue to Golden Meadow and along Bayou Lafourche and from Bayou Lafourche to Grand Isle would result in limited damages to the oyster industry provided recommendations incorporated herewith are observed. However, the construction of that segment of the project from Barataria Pass to the Jump would, in the opinion of our marine biologists, wreak havoc on the existing oyster industry in Louisiana, resulting in a loss of \$500,000 to \$1 million annually in the fishery resources income of the State. The principal reasons for arriving at this conclusion are as follows:

1. The route of the canal as proposed traverses the very heart of the leased oyster areas of Louisiana. This area is the principal fattening and growing area for over 75 percent of the oyster production in Louisiana.

2. The proposed route of the canal would totally destroy or directly affect from 100 to 200 oyster leases which would require compensation amounting to several hundred thousand dollars to the lessees.

3. It has been proposed in the survey report on page 20a, paragraph c and page 20c, paragraph h, that oyster leases directly affected by the proposed channel could be moved to other water bottoms thereby resulting in no loss. It is inconceivable that such a proposal could be made in good faith by anyone having a knowledge of the oyster industry in general and a knowledge of the oyster industry in Louisiana in particular. The selection of sites for oyster leases is controlled by bottom characteristics, salinities, current paths and velocities, and the general food conditions which must be suitable for rapid oyster growth. The fact that the selection of sites for oyster leases is a critical operation is reflected in the ratio of total lease acreage to total water bottom acreage. For example, only some 50,000 acres of leased bottoms occur in Louisiana in comparison to several million acres of water bottoms. If all bottoms were suitable for oysters, it is probable that most of the water bottoms of Louisiana's coastal area would be under lease at present, because the demand for oysters on the market would result in total utilization. A striking example of the critical location of oyster-leases may be seen in Bastian Bay. This bay lying in the heart of the oyster growing area, has numerous leases strategically placed along its shore and through the bay in general; yet there are large areas of the bay which never have

been and never will be leased because these are not suitable for oyster culture.

4. Other factors, which preclude the movement of leases or oyster-beds from one area to another in exceptional cases where possible, would involve considerable expense to the oyster grower for preparing new bottoms and moving the oysters. In addition to these expenses, other problems and expenses would be incurred if established camps had to be moved to the vicinity of newly prepared bottoms. Such camps serve as homes and centers of operations during the planting and harvesting seasons. The basis investment in camps and wharves may be in excess of \$50,000 for the average oyster grower.

5. Indirect effects. In view of the fact that this proposed channel crosses the heart of the major oyster producing area in the State, indirect effects on the general ecology of this area could result in extensive damages to all the oyster leases paralleling the canal for a minimum distance of 4 miles on each side of the channel. The route of the canal in an east-west alignment cuts across the normal drainage pattern of the area which is a meandering system of bayous and small bays from north to south. Unless every waterbody crossed is left open to maintain its present drainage pattern, then spoil deposition will form an effective barrier between the fresher water coming from the north and the saltier water coming from the south. From past experience with similar projects it is highly improbable that spoil deposition will be left in such a manner as to totally unaffected existing drainage patterns. For example, Federal regulations administered by the Corps of Engineers require that spoil deposition across open waters be leveled to within 6 inches of the previously existing bottom. In our experience, this regulation has been rarely enforced and there seem to be no mechanics for enforcing such.

Assuming that spoil is deposited in such a manner that north-south drainage is not interrupted, there is still a critical factor regarding changes in current, direction, and velocity. For example, waters moving down from the north or in from the south may be shunted from their normal paths in a lateral direction through the navigation canal. Such a change in current direction could adversely affect oysterbeds now dependent upon these currents.

It has been suggested in the survey report that fresh water entering the proposed canal from the Jump would be beneficial to the oyster growing area. However, such benefits could not be realized unless there was a water control structure at the junction of the canal and the Jump. For example, during periods of high river stages during the warm months of the year, it is likely that there would be extensive oyster mortalities because of excessive fresh water. This adverse effect has been observed as recently as 1957 when a privately owned canal introduced excessive amounts of fresh water from the Jump into oyster growing areas, resulting in a total loss. While the oyster areas of Louisiana are in great need of fresh water from the Mississippi River, only a controlled introduction of such water can be considered as beneficial.

In summary, it is recognized that construction of the several segments of this project will affect wildlife and fishery resources directly and indirectly in the project area and adjacent areas. Oysters, fur-bearers, and waterfowl are of primary concern, while other related forms as members of the separate communities are also of serious

concern. Possible benefits and the reduction of losses can be achieved in the design, construction, and maintenance phases of the several segments of the project provided there is close coordination and cooperation between the planning and contracting agency, the contractor(s) and the authorities of this commission. The planning and contracting agency should assume the direct responsibility for determining that all losses or damages resulting from the project receive full and just compensation by local interests who have voluntarily obligated themselves to hold the U.S. Government free of all damages and losses as a result of securing the project. This commission will be pleased to cooperate and assist the planning and contracting agency and the contractor(s) in safeguarding valuable fish and wildlife resources and habitat which will be endangered by the project.

We appreciate very much having the opportunity to review and comment on this proposed survey report in the interest of the fish and wildlife resources of the State of Louisiana. A large scale map (1:20,000) showing the locations of the oyster leases referred to above, has been prepared and is available for inspection and study in our New Orleans office. Our technicians will be pleased to cooperate with representatives of other agencies during the detailed planning stages and during construction of these segments described above, if this project is found to be feasible. Enclosed is the copy of the survey report, which is being returned as requested by you.

If we can be of further assistance, kindly feel free to call on us.

Sincerely yours,

F. L. CLEMENT, *Director.*

COMMENTS OF THE DEPARTMENT OF THE INTERIOR

DEPARTMENT OF THE INTERIOR,
OFFICE OF THE SECRETARY,
Washington, D.C., September 29, 1958.

Maj. Gen. E. C. ITSCHNER,
Chief of Engineers,
Department of the Army, Washington, D.C.

DEAR GENERAL ITSCHNER: This is in reply to your letter of June 30 transmitting for our comments copy of your proposed report, together with the reports of the Board of Engineers for Rivers and Harbors and of the district and division engineers, on a survey report on Bayou Lafourche and Lafourche-Jump Waterway, La. Your report recommends improvement of Bayou Lafourche, construction of an auxiliary channel paralleling the bayou, and construction of a navigation channel from Bayou Lafourche to Bayou Rigaud to meet the needs of established and prospective navigation.

The U.S. Fish and Wildlife Service informs me that it cannot agree with the conclusions of the district engineer that the proposed construction will not seriously damage fish and wildlife resources or that the suggested measures for ameliorating adverse effects on fish and wildlife resources are not warranted. Attached are the Service's detailed comments on the conclusions of the district engineer. It is recommended that prior to transmittal of your report to the Congress, further consideration be given to means and measures for the preservation of fish and wildlife values.

Other interests of the Department would not be adversely affected by the proposed construction.

Sincerely yours,

FRED G. AANDAHL,
Assistant Secretary of the Interior.

DETAILED COMMENTS OF U.S. FISH AND WILDLIFE SERVICE ON CORPS OF ENGINEERS REPORT ON BAYOU LAFOURCHE AND LAFOURCHE-JUMP WATERWAYS, LA.

It appears that the report of the Corps of Engineers tends to contradict, without cause, the biological findings of the U.S. Fish and Wildlife Service and the Louisiana Wild Life and Fisheries Commission. Specific comments on portions of the report of the district engineer are as follows:

Paragraph 61(a).—Assumption that navigation has paramount right in natural waters, as is stated, is open to question in both theory and application. Reasonable consideration of all resources and uses should determine public development of water resources; furthermore, with the Corps of Engineers plan of development, watercourses and the water therein will be far from natural. Fishery industries have in the past been able to conduct their operation with existing navigable waterways.

Paragraph 61(b).—We cannot endorse the first statement which points out that most of the area through which the proposed Bayou Lafourche bypass route passes is now open to salt water intrusion from the Gulf of Mexico. The marsh through which the entire bypass channel is alined, from the point it leaves the Gulf Intracoastal Waterway to the point it reenters Bayou Lafourche below Leeville, has been mapped by the Louisiana Wild Life and Fisheries Commission as being a fresh marsh at the northerly portion and three-corner grass marsh (brackish) in the remainder. Our field observation at the time of study confirmed this. Bayou Lafourche, with a controlling depth of about 6 feet, is the principal entry of Gulf of Mexico salinities. Other canals and bayous connect the project area to inside waters, such as Timbalier Bay, Lake Raccourci, Little Lake, Lake Felicity, and Lake Chien which are of lesser salinities and are of importance as "mixing bowl" areas between fresh and saline water sources. The fact that these inside waters are of reduced salinities is directly recognized in paragraph 61(c) where it is stated that these are commercially important oyster-growing waters; and in paragraph 105, justifying navigation needs, it is stated that large quantities of oysters are produced in shallow bays such as Lake Raccourci, Little Lake, Timbalier Bay, and others. Oyster-producing waters are of reduced salinities.

Paragraph 61(c).—The district engineer implies that since little, if any, dredging will be required in the areas of the existing oyster beds, these beds will not be seriously affected. Actually, dredging in any portion of Grand Bayou Blue would probably destroy any oyster beds in the bayou and in Little Lake downstream by covering them with silt, if not by direct excavation.

Paragraph 61(d).—As written, the comment of the district engineer implies that the proper use of spoil would benefit the waterfowl and fur animal resources. This is not the case. The letter from Regional

Director Gresh of February 10, 1954 (app. G) simply indicates that careful planning of spoil disposal could reduce the losses to fish and wildlife resources brought about by the project.

Paragraph 61(e).—It is not clear what the cited salinity records in the Intracoastal Waterway at Larose are meant to explain, or refute. These records support our contention that the northerly portion of the area is basically fresh marsh. Larose is at the northern extreme of the project; however, salt water intrusion would emanate from the southern end or through the mouth of Bayou Lafourche.

Paragraph 61(g).—As previously stated in paragraphs 9 and 10 of the district engineer's report, the controlling depths of southwest Louisiana Canal is about 7.5 feet; Havoline Canal about 5 feet; and Grays Canal about 5 feet. These figures are not quite in accord with the intent of expressions contained in paragraph 61(g) which indicates that both the Havoline and southwest Louisiana Canals have existing depths of about 8 feet. Also, as we previously explained, inside waters these canals enter are of reduced salinities. Bayou Lafourche at Belle Pass would be the principal source of gulf salinities, and a 12- by 125-foot cut from the mouth of Bayou Lafourche through the Grand Bayou Blue marsh would have significant effect as compared to the present restricted channel of Bayou Lafourche with controlling depth of 6 feet and no direct connection with the interior of the marsh.

Paragraph 66.—The Corps of Engineers indicates that the salt water control structure requested in the report of the U.S. Fish and Wildlife Service would not protect the area with any degree of certainty as it would be circumvented by dredged canals. We believe the salt water guard lock requested in our plan would provide as much control against saline water intrusion as can be expected with project channelization. With adequate consideration given to control of salt water intrusion in future canal construction, if and when it occurs, the inner marsh could be protected. The last sentence of the introductory paragraph stating that natural erosion, in addition to canal dredging, is opening the area to salt water intrusion would seem to indicate that engineering activities along the coast are a significant factor in salt water intrusion into the marsh.

Paragraph 66(a).—This statement, to the effect that the construction of the project will not prove excessively harmful to the area, appears to be a contradiction of the opinions of State and Federal fish and wildlife agencies which have evaluated the problem.

Paragraph 66(b).—Prior to acceptance of the theory that proper disposition of spoil along the eastern side and along the upper reaches of the canal could enhance much of the area as a fresh water marsh, marsh ecologists would need to make a detailed study of land and water conditions. Adequate structures to control waters of tributary areas would be required as well as careful spoil placement and protective features in the channel to prevent erosion of the levee.

Paragraph 66(d).—It is stated that, except for the eastern end, the Lafourche-Jump Waterway follows closely the gulf rim and most of the area traversed is highly saline under present conditions. The western end of the Lafourche-Jump Waterway is the only portion recommended for construction. Interior marshes (Leeville vicinity) are brackish marshes. The Louisiana Wild Life and Fisheries Commission is presently developing an intensively managed waterfowl area here. Water control to produce more favorable duck and goose habitat will be undertaken.

Paragraph 66(f).—It is stated that the salinity of the area between Sandy Point and Bayou Lafourche would be unchanged as the proposed waterway would be very close to the sea rim and existing inlets make the area a saline marsh. In the vicinity of Bayou Lafourche, brackish conditions prevail. Here the route of the proposed waterway, as we understand it, is not near the sea rim. Salinities would probably be subject to change for the worse as far as fish and wildlife are concerned.

Paragraph 66(k).—The opinion of the district engineer to the effect that neither the salinity nor the existing current patterns of the area will be appreciably altered is not held by all who have studied the proposed plans.

Paragraph 66(l).—It is probable that, as is stated, the waterway could be routed so as to not seriously conflict with existing oyster beds; however, the report of the district engineer does not indicate that this will be done if the project is authorized.

Paragraph 66(m).—The district engineer states that bucket instead of hydraulic dredging would eliminate turbidity and allow control of spoil so as to prevent any damages from those causes. Although bucket dredging would be much less detrimental to fish and wildlife resources than hydraulic dredging and permit better control of spoil, no assurance is given that bucket dredging will be employed if the project is authorized.

Paragraph 66(n).—The statement that construction of the project would not be detrimental to wildlife or fishery resources of the area but would be of immense benefit to those engaged in these occupations is contradictory to the findings of the agencies responsible for evaluating the effects of the proposed project upon fish and wildlife resources. We do not believe that it is either the responsibility or the prerogative of the Corps of Engineers to make this conclusion.

LETTER TO THE SECRETARY OF THE INTERIOR

HEADQUARTERS, DEPARTMENT OF THE ARMY,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, D.C., January 29, 1959.

The Honorable the SECRETARY OF THE INTERIOR.

DEAR MR. SECRETARY: This is in response to letter of September 29, 1958, from the Assistant Secretary of the Interior on the proposed report on Bayou Lafourche and Lafourche Jump Waterway. Your letter enclosed detailed comments by the Fish and Wildlife Service.

In accordance with your recommendation, further consideration has been given to the means and measures which could be added to our recommended navigation proposal in order to conserve the fish and wildlife resources. However, since the details of the work necessary for mitigating possible damages from the improvement can normally be worked out during the planning and construction phases of the project, further delay of our report to Congress on the needed and justified navigation improvements does not appear warranted. In the normal course, there will be sufficient time during the advance planning and the early construction phases for the Fish and Wildlife Service to investigate conservation measures. In this low area of the gulf coast, waterborne equipment of the oil industry moves overland

by dredging its way as needed. The Federal channel proposed will provide a waterway in a central location which would lessen the number of new channels through the marshes. Therefore, we believe that the recommended improvement would not add materially to the overall effect on the game and fish life of the area.

In the following paragraphs, there is a discussion of our further examination made as a result of the detailed fish and wildlife comments.

The Fish and Wildlife Service has requested a saline control structure near the lower end of the channel recommended for Grand Bayou Blue in order to protect the upstream marsh area from salt water intrusion. We believe that provision of this structure would not protect the area with any degree of certainty since the lock would be bypassed by many natural lagoons, and bayous and channels dredged by the local interests. We have found that the cost of a guard lock suitable for the navigation on this waterway would be in excess of \$3.5 million. If such a lock were included as proposed, the plan of improvement would not be economically justified by the present benefit evaluation.

The Service notes that possible detrimental effects of the proposed works on the salinities in the areas to be traversed can be kept to a minimum by routing the channels to avoid existing oysterbeds and by dredging with dragline or bucket dredges in order to reduce turbidity and to allow control of spoil placement. The Service states that no assurances are given in the report that these measures will be undertaken. You may be assured that if the project is authorized, construction will be accomplished by these methods to the maximum extent practicable consistent with navigation requirements and reasonable costs. Selection of the exact routing of the channels would necessarily have to await the planning and construction stages of the improvement since the cultivation of new oyster producing areas and the continuing exploration and operation of new oil wells would be factors influencing channel locations.

Concerning the placing of spoil in a levee line along the upper reaches of Grand Bayou Blue, the Fish and Wildlife Service points out that a detailed study by marsh ecologists would be necessary prior to an evaluation of this procedure. Should the Service desire to undertake such an investigation, we will be pleased to furnish available data obtained for our report on the area.

The director of the department of public works, who represents the State of Louisiana in coordinating our reports, has concurred in the recommendations for Bayou Lafourche and Lafourche Jump Waterways and has forwarded comments of the Louisiana Wild Life and Fisheries Commission. The commission made known its desires concerning the methods of dredging and the placing of spoil. This matter will be worked out in close coordination with the Fish and Wildlife Service and the Louisiana commission during planning and construction of the project.

To avoid misunderstanding, the statement in the report that navigation has a paramount right in natural waters has been revised.

Please be assured that I concur in the view of the Fish and Wildlife Service that reasonable consideration of all factors should determine public development of water resources. I believe that construction of the navigation improvement with due consideration of other resources will constitute a valuable contribution to the develop-

ment of this area. Coordination among the interested Federal and State agencies in this improvement will assure proper project formulation.

Copies of this correspondence will accompany the report when it is transmitted to Congress.

Sincerely yours,

E. C. ITSCHNER,
Major General, U.S. Army, Chief of Engineers.

COMMENTS OF THE SECRETARY OF COMMERCE

THE SECRETARY OF COMMERCE,
Washington, D.C. August 8, 1958.

Maj. Gen. EMERSON C. ITSCHNER,
Chief of Engineers, Department of the Army, Office of the Chief of Engineers, Washington, D.C.

DEAR GENERAL ITSCHNER: Reference is made to your letter of June 20, 1958, requesting the comments of the Department of Commerce on your proposed report on the Bayou Lafourche and Lafourche-Jump Waterway, La.

Our Coast and Geodetic Survey has informed us that except for the area from Larose to Golden Meadow, the project area is well covered with triangulation control. Also, the proposed channels are not more than 7 miles from established second-order bench marks. Any third order leveling which may be needed can be accomplished by project engineers. The Coast and Geodetic Survey does not contemplate any additional triangulation or leveling in the project area at least through fiscal year 1960.

Your proposed report recommends that local interests agree, among other things, to construct, maintain, and operate a pontoon bridge on State Highway Route No. 24 (also identified as Louisiana FAS Route 649) across the auxiliary channel at Larose. Federal-aid highway funds would not be eligible to contribute toward the cost of constructing the bridge. It is our understanding that after considerable correspondence between the Louisiana State Highway Department, the Louisiana Department of Public Works, and the field office of the Corps of Engineers which prepared the field report, the Louisiana Department of Public Works has agreed to construct this bridge, and the Louisiana Department of Highways has agreed to maintain and operate the bridge after it has been constructed. We have been informed that the State highway department still is unwilling to finance the cost of constructing the bridge with funds appropriated for highway purposes.

We greatly appreciate the opportunity to review this proposed report.

Sincerely yours,

SINCLAIR WEEKS,
Secretary of Commerce.

BAYOU LAFOURCHE AND LAFOURCHE-JUMP WATERWAY, LA.

REPORT OF THE CHIEF OF ENGINEERS,
DEPARTMENT OF THE ARMY

DEPARTMENT OF THE ARMY,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, D.C., February 2, 1959.

Subject: Bayou Lafourche and Lafourche-Jump Waterway, La.
To: The Secretary of the Army.

1. I submit for transmission to Congress the report of the Board of Engineers for Rivers and Harbors in response to the resolution of the Committee on Rivers and Harbors of the House of Representatives adopted November 13, 1946, requesting the Board to review the reports on Barataria Bay, La., submitted in House Document No. 200, 65th Congress, 1st session, with a view to determining the advisability of providing a connecting waterway of adequate depth to a point at or near Grande Ecaille. It is also in partial response to the River and Harbor Act, approved March 2, 1945, authorizing preliminary examinations and surveys for flood control, irrigation, navigation, and drainage, and for the prevention of stream pollution and salt water intrusion * * * on all streams and bayous in Louisiana lying between the East Atchafalaya Basin protection levee and the Mississippi River * * *; for Bayou Lafourche, La., from the Gulf of Mexico to Leeville or to Golden Meadow; and for Bayou Lafourche, La., from Donaldsonville to the Intracoastal Waterway, via Bayou Boeuf, Assumption Parish, or other streams, in the interest of navigation, flood control, beneficial uses of water, malarial control, prevention of stream pollution, and of the location of locks at the head of said bayou at or near Donaldsonville, La.; and to the Flood Control Act, approved December 22, 1944, authorizing preliminary examinations and surveys for flood control, rice irrigation, navigation, pollution, salt water intrusion, and drainage * * * on all streams and bayous in Louisiana lying between the East Atchafalaya Basin protection levee and the Mississippi River * * *.

2. The district and division engineers report that improvement of Bayou Lafourche, construction of an auxiliary channel paralleling the bayou, and construction of a navigation channel from Bayou Lafourche to Bayou Rigaud is advisable to meet the needs of established and prospective navigation. They estimate that the average annual benefits will exceed the annual carrying charges by a ratio of 1.4 to 1.

3. After full consideration of the reports of the district and division engineers, the Board recommends modification of the existing project for Bayou Lafourche, La., to provide for dredging an auxiliary channel, 12 feet deep and 125 feet wide, from the Intracoastal Waterway at mile 37.2 west of Harvey Lock, generally parallel to and west of

Bayou Lafourche along Grand Bayou Blue, to Bayou Lafourche below the highway bridge at Leeville at mile 12, thence in the bayou to the 12-foot depth in the Gulf of Mexico; dredging a channel 9 feet deep and 100 feet wide in Bayou Lafourche from Leeville to the vicinity of the lower limits of Golden Meadow; restoring and extending the existing jetties at Belle Pass from the 6-foot to the 12-foot depth, if found advisable in order to reduce maintenance dredging in the Gulf of Mexico; and dredging a channel 12 feet deep and 125 feet wide from Bayou Lafourche at Leeville through the Southwest Louisiana Canal to and through Bayou Rigaud; all generally in accordance with the plans of the district engineer and with such modifications thereof as in the discretion of the Chief of Engineers may be advisable; at an estimated cost of \$4,664,000 for construction and \$68,500 for annual maintenance in addition to that now required, provided local interests prior to construction agree to: (a) furnish without cost to the United States all lands, easements, rights-of-way, and spoil-disposal areas necessary for the construction of the project and for subsequent maintenance, when and as required; (b) make all necessary alterations to pipelines, cables, and other facilities; (c) dredge and maintain a connecting channel 12 feet deep and 125 feet wide from Golden Meadow to the auxiliary channel; (d) construct, maintain, and operate a pontoon bridge across the auxiliary channel where required; and (e) hold and save the United States free from damages due to the construction and maintenance of the project; and provided further that dredging either the auxiliary channel and Bayou Lafourche, or the waterway from Leeville to and through Bayou Rigaud, may be undertaken independently whenever funds are available and the prescribed local cooperation has been provided for the respective work.

4. After due consideration of these reports, I concur in the views and recommendations of the Board.

E. C. ITSCHNER.
Major General, USA, Chief of Engineers.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS

CORPS OF ENGINEERS, U.S. ARMY,
BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, D.C., April 29, 1958.

Subject: Bayou Lafourche and Lafourche-Jump Waterway, La.
To: The Chief of Engineers, Department of the Army.

1. This report is submitted in response to the following resolution adopted November 13, 1946:

Resolved by the Committee on Rivers and Harbors of the House of Representatives, United States, That the Board of Engineers for Rivers and Harbors be, and is hereby, requested to review the reports on Barataria Bay, Louisiana, submitted in House Document Numbered 200, Sixty-fifth Congress, first session, with a view to determining the advisability of providing a connecting waterway of adequate depth to a point at or near Grande Ecaille.

It is also in partial response to the River and Harbor Act, approved March 2, 1945, authorizing preliminary examinations and surveys for flood control, irrigation, navigation, and drainage, and for the prevention of stream pollution and salt water intrusion * * * on all streams

and bayous in Louisiana lying between the East Atchafalaya Basin protection levee and the Mississippi River * * *; for Bayou Lafourche, La., from the Gulf of Mexico to Leeville or to Golden Meadow; and for Bayou Lafourche, La., from Donaldsonville to the Intracoastal Waterway, via Bayou Boeuf, Assumption Parish, or other streams, in the interest of navigation, flood control, beneficial uses of water, malarial control, prevention of stream pollution, and of the location of locks at the head of said bayou at or near Donaldsonville, La.; and to the Flood Control Act, approved December 22, 1944, authorizing preliminary examinations and surveys for flood control, rice irrigation, navigation, pollution, salt water intrusion, and drainage * * * on all streams and bayous in Louisiana lying between the East Atchafalaya Basin protection levee and the Mississippi River * * *.

2. Bayou Lafourche, a former distributary of the Mississippi River in southeastern Louisiana, extends in a southerly direction from the Mississippi River at Donaldsonville 107 miles to the Gulf of Mexico at Belle Pass. The mean range of tide at the mouth is about 1 foot. The Gulf Intracoastal Waterway, which is 12 feet deep and 125 feet wide, crosses the bayou at Larose, mile 39.6. Its former channel in Bayou Lafourche from Larose upstream to Lockport is authorized for maintenance to a depth of 9 feet over a width of 100 feet. Grand Ecaille lies on the eastern edge of Barataria Bay, in the coastal area between Bayou Lafourche and the Mississippi River. The present Federal project provides for the permanent closure of the head of Bayou Lafourche, without a lock; a channel 6 feet deep and 60 feet wide from Napoleonville to Lockport, and from Larose to the Gulf of Mexico by way of Belle Pass; the closure of Pass Fourchon; and a jettied entrance at the mouth of Belle Pass. Total Federal cost to June 30, 1956, was \$838,682, of which \$271,089 was for new work and \$567,593 for maintenance. Local interests have dredged and maintained many canals which enter Bayou Lafourche. They have also installed pumps and siphons at the head of Bayou Lafourche to draw water from the Mississippi River into the bayou to relieve pollution and for industrial and municipal use.

3. The alluvial ridges along Bayou Lafourche above Golden Meadow are cultivated extensively, with sugarcane being the principal crop. Between Larose and Golden Meadow, mile 26, a gradual transition occurs in which agricultural pursuits are replaced by fishing activities with shrimp being the most important fishery in the area. Crude oil is produced from several fields located along the bayou, and extensive exploration is taking place. Population in the tributary area of Bayou Lafourche is estimated to be 58,500. The only settlements near the gulf between Bayou Lafourche and the Mississippi River are at Grand Isle and Venice which have populations of 600 and 500, respectively. Commerce on Bayou Lafourche has averaged about 1,564,000 tons over the 10-year period, 1946 through 1955, consisting principally of shells, sulfur, drilling supplies, and crude oil. Vessel traffic on the waterway totaled about 25,000 trips in 1955. Traffic between Bayou Lafourche and the Mississippi River goes either by way of the Intracoastal Waterway or through the open waters of the Gulf of Mexico.

4. Local interests desire that Bayou Lafourche be enlarged from Larose to the Gulf of Mexico, that an auxiliary channel be dredged to bypass the congested area of the bayou between Larose and Leeville,

and that a navigable connection be provided between Bayou Lafourche at Leeville and the Mississippi River at the jump.

5. The district engineer finds that the most suitable plan of improvement would be to provide about 28 miles of new auxiliary channel, 12 feet deep and 125 feet wide, west of and generally paralleling Bayou Lafourche from the Gulf Intracoastal Waterway near Larose to Bayou Lafourche below Leeville, and enlarge the channel in the bayou to the same dimensions from Leeville to the 12-foot depth in the Gulf of Mexico; provide a connecting channel of the same dimensions from Golden Meadow to the new auxiliary channel; provide a channel 9 feet deep and 100 feet wide in Bayou Lafourche from Golden Meadow to Leeville; restore and extend the existing jetties at Belle Pass to the 12-foot depth in the Gulf of Mexico, if found advisable to reduce maintenance dredging in the Gulf of Mexico; and provide a channel 12 feet deep and 125 feet wide from Bayou Lafourche at Leeville, eastward through the Southwest Louisiana Canal for 3.8 miles, turning southeastward to Bay St. Honore, thence through Bayou Rigaud, and thence generally paralleling the shoreline of the Gulf of Mexico to the Mississippi River at the Jump, for a total length of about 61 miles. However, local interests are unwilling to meet the requirements of local cooperation for that part of the proposed waterway traversing Plaquemines Parish which includes the reach east of Barataria Bay. Therefore, the plan proposed by the district engineer excludes the portion of the Lafourche-Jump Waterway east of Barataria Pass. He also finds that improvement to Grand Ecaille is not economically justified. The U.S. Fish and Wildlife Service, and the Louisiana Wild Life and Fisheries Commission, have expressed concern that the navigation channels proposed will increase salinity in the marsh areas and adversely affect the fish and wildlife resources in the immediate area, and that construction would damage established oysterbeds. The district engineer concludes that any increase in salinity which might result from the improvement would be minor, and control structures would be relatively ineffective because of the many dredged canals now honeycombing the area. Proper deposition of spoil would minimize damage to oysterbeds. He estimates the initial cost of the improvements recommended, based on December 1956 prices, at \$6,025,000 including \$1,343,000 to be borne by local interests for dredging the stub channel from Golden Meadow to the new auxiliary channel, constructing a pontoon bridge across the new auxiliary channel near Larose, furnishing rights-of-way, lowering pipelines and submarine cables, and providing spoil disposal areas. The Federal first cost, including \$18,000 for navigation aids, would be \$4,682,000. The total annual carrying charges would be \$312,000, including \$99,600 for maintenance, of which \$68,500 for dredging and jetty repair and \$1,100 for navigation aids would be Federal, and \$30,000 for dredging and bridge operation and maintenance would be non-Federal. Annual benefits are estimated at \$444,800, resulting from savings in the transportation of petroleum, equipment and supplies for oil exploration activities, and sulfur; harbor of refuge benefits; and reduced operating costs for the fishing fleet. The benefit-cost ratio is 1.4. The district engineer recommends his plan as outlined above at an estimated Federal first cost of \$4,664,000 for construction and an annual Federal maintenance cost of \$68,500, subject to certain conditions of local cooperation. The division engineer concurs.

6. The division engineer issued a public notice informing interested parties of the recommendations of the reporting officers, and giving them an opportunity to present additional information to the Board. No communications have been received.

VIEWS AND RECOMMENDATIONS OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS

7. The Board of Engineers for Rivers and Harbors concurs in the views and recommendations of the reporting officers. The existing channel in Bayou Lafourche is inadequate for the present and reasonably prospective future navigation, and need exists for a waterway paralleling the gulf coast from Bayou Lafourche to the Mississippi River at the Jump. Although the section of that waterway from Barataria Pass to the Jump is economically justified, it is not recommended because of lack of local cooperation. Other connecting routes including a channel from the east side of Barataria Bay to Grand Ecaille are desirable but lack economic justification. The improvements proposed by the district engineer are suitable and economically justified.

8. Therefore, the Board recommends modification of the existing project for Bayou Lafourche, La., to provide for dredging an auxiliary channel, 12 feet deep and 125 feet wide, from the Intracoastal Waterway at mile 37.2 west of Harvey lock, generally parallel to and west of Bayou Lafourche along Grand Bayou Blue, to Bayou Lafourche below the highway bridge at Leeville at mile 12, thence in the bayou to the 12-foot depth in the Gulf of Mexico; dredging a channel 9 feet deep and 100 feet wide in Bayou Lafourche from Leeville to the vicinity of the lower limits of Golden Meadow; restoring and extending the existing jetties at Belle Pass from the 6-foot to the 12-foot depth, if found advisable in order to reduce maintenance dredging in the Gulf of Mexico; and dredging a channel 12 feet deep and 125 feet wide from Bayou Lafourche at Leeville through the southwest Louisiana Canal to and through Bayou Rigaud; all generally in accordance with the plans of the district engineer and with such modifications thereof as in the discretion of the Chief of Engineers may be advisable; at an estimated cost of \$4,664,000 for construction and \$68,500 for annual maintenance in addition to that now required; provided local interests prior to construction agree to: (a) furnish without cost to the United States all lands, easements, rights-of-way, and spoil-disposal areas necessary for the construction of the project and for subsequent maintenance, when and as required; (b) make all necessary alterations to pipelines, cables, and other facilities; (c) dredge and maintain a connecting channel 12 feet deep and 125 feet wide from Golden Meadow to the auxiliary channel; (d) construct, maintain, and operate a pontoon bridge across the auxiliary channel where required; and (e) hold and save the United States free from damages due to the construction and maintenance of the project; and provided further that dredging either the auxiliary channel and Bayou Lafourche, or the waterway from Leeville to and through Bayou Rigaud, may be undertaken independently whenever funds are available and

the prescribed local cooperation has been provided for the respective work.

For the Board:

CHAS G. HOLLE,
Major General, U.S. Army, Chairman.

REPORT OF THE DISTRICT ENGINEER

SYLLABUS

The portion of Bayou Lafourche south of Larose is used by vessels engaged in the movement of crude oil, supplies, and equipment for the drilling of oil wells, and in the shrimping and oyster fisheries.

The existing project dimensions of 6 by 60 feet on Bayou Lafourche south of the Intracoastal Waterway are not adequate for the vessels employed by the oil industry. Barges cannot be loaded to capacity, and tows must move at slow speeds, particularly along the congested reach between Larose and Leeville. Wave action reduces the project depth of 6 feet in Belle Pass to such an extent that the larger shrimping vessels must enter and leave the gulf by circuitous routes. Likewise, the movement of supplies and equipment through Belle Pass to the offshore oil areas in the gulf near Bayou Lafourche is interrupted during rough weather.

The most practical plan of providing for this need consists of—

(a) An auxiliary channel 12 by 125 feet from the gulf Intracoastal Waterway west of Larose to Bayou Lafourche at Leeville. This channel would allow the heavy oil-field traffic to bypass the most congested portion of Bayou Lafourche. Louisiana Highway No. 24 would cross the auxiliary channel on a pontoon bridge near the upper end of the channel.

(b) Enlargement of the existing channel of Bayou Lafourche from Leeville, La., to provide a 12- by 125-foot channel to the 12-foot depth contour in the Gulf of Mexico.

(c) Enlargement of the existing channel of Bayou Lafourche downstream from the lower limits of Golden Meadow, La., to provide a 9- by 100-foot channel to Leeville, La.

The Federal first cost and annual charges (exclusive of the cost of navigation aids) of this improvement are estimated at \$2,833,000 and \$168,000, respectively, for the initial construction with provision for extension of the jetties to the 12-foot depth contour at an additional estimated cost of \$462,000 if and when found advisable. The corresponding non-Federal items for initial construction would be \$1,270,000 and \$74,300. The total annual benefits are estimated at \$344,100 and the benefit-to-cost ratio would be 1.4 to 1.

A need exists for a navigable waterway connection between Bayou Lafourche and the Mississippi River at the Jump (Venice, La.). Such a route would allow freedom of east-west movement for fishing vessels, and oil-field supplies, and equipment. The transfer of vessels in this area is accomplished only by the use of circuitous routes.

The most practical plan for providing for this need consists of a 12- by 125-foot channel from Bayou Lafourche through the southwest Louisiana Canal following along the gulf rim as closely as possible to connect with the Mississippi River at the Jump. This channel shows economic justification, however, local interests in Plaquemines Parish are opposed to furnishing the right-of-way, and the Louisiana Oyster Dealers and Growers Association, Inc., and the Louisiana Wild Life and Fisheries Commission are opposed to the construction on the basis of damages to existing oyster and fisheries values.

A 12- by 125-foot channel connecting Bayou Lafourche with Barataria Pass will serve a large portion of vessel traffic in this area and result in economies of transportation for fishing, oil, and towing interests.

The Federal first cost and annual charges (exclusive of the cost of navigation aids) for providing this navigable connection between Bayou Lafourche and Barataria Pass are estimated at \$1,369,000 and \$65,600, respectively; while the corresponding non-Federal items would be \$73,000 and \$3,000. The total annual benefits are estimated at \$100,700; and the benefits to charges ratio would be 1.5 to 1.

The ratio of benefits to annual charges is favorable on the proposed improvement of Bayou Lafourche and on the channel from Bayou Lafourche to Barataria

Pass, and it is recommended that these channels be improved as described herein, subject to the conditions of local cooperation stipulated herein.

**CORPS OF ENGINEERS, U.S. ARMY,
OFFICE OF THE DISTRICT ENGINEER,
NEW ORLEANS DISTRICT,**
New Orleans, La., December 20, 1956.

Subject: Survey report on Bayou Lafourche, La., and Lafourche-Jump Waterway, La.

Through: The Division Engineer, lower Mississippi Valley division, Corps of Engineers, Vicksburg, Miss.

To: The Chief of Engineers, Department of the Army, Washington, D.C.

AUTHORITY

1. This report is submitted in—

(a) Partial response to the following:

(1) Flood Control Act approved December 22, 1944 (Public Law 534, 78th Cong., 2d sess.):

SEC. 11. The Secretary of War is hereby authorized and directed to cause preliminary examinations and surveys for flood control and allied purposes * * * to be made * * * which will include the following-named localities * * *:

For flood control, rice irrigation, navigation, pollution, salt water intrusion, and drainage * * * on all streams and bayous in Louisiana lying between the east Atchafalaya Basin protection levee and the Mississippi River. * * *

(2) Rivers and Harbors Act approved March 2, 1945 (Public Law 14, 79th Cong., 1st sess.):

SEC. 6. The Secretary of War is hereby authorized and directed to cause preliminary examinations and surveys to be made at the following named localities * * *:

For flood control, irrigation, navigation, and drainage, and for prevention of stream pollution and salt water intrusion * * * on all streams and bayous in Louisiana lying between the east Atchafalaya Basin Protection Levee and the Mississippi River. * * *

(b) Response to the following authorizations:

(1) Rivers and Harbors Act approved March 2, 1945 (Public Law 14, 79th Cong., 1st sess.):

SEC. 6. The Secretary of War is hereby authorized and directed to cause preliminary examinations and surveys to be made at the following named localities * * *:

Bayou Lafourche, Louisiana, from the Gulf of Mexico to Leeville or to Golden Meadow.

Bayou Lafourche, Louisiana, from Donaldsonville to the Intracoastal Waterway, via Bayou Boeuf, Assumption Parish, or other streams, in the interest of navigation, flood control, beneficial uses of water, malarial control, prevention of stream pollution, and of the location of locks at the head of said bayou at or near Donaldsonville, La. * * *

(2) Response to the following resolution adopted November 13, 1946:

Resolved by the Committee on Rivers and Harbors of the House of Representatives, United States, That the Board of Engineers for Rivers and Harbors be, and is hereby, requested to review the reports on Barataria Bay, Louisiana, submitted in House Document Numbered 200, Sixth-fifth Congress, first session, with a view to determining the advisability of providing a connecting waterway of adequate depth to a point at or near Grand Ecaille.

(c) Assignment of the examinations to the division engineer, lower Mississippi Valley division, was made by letter from the

Chief of Engineers, dated March 9, 1945, CE-SPEWR (assignment of examinations, Rivers and Harbors Act approved March 2, 1945).

(d) Assignment to the district engineer, New Orleans district, was made by letter from the division engineer, lower Mississippi Valley division, dated June 28, 1945, LMVEE (assignment of examinations, Rivers and Harbors Act approved March 2, 1945). The preliminary examination on Bayou Lafourche was completed October 4, 1948, and the preliminary examination on the Lafourche-Jump Waterway was completed August 31, 1951.

(e) Assignment of the survey of Bayou Lafourche to the division engineer, lower Mississippi Valley division, was made by letter from the Chief of Engineers dated March 24, 1949, ENGWR; and assignment to the district engineer, New Orleans district, was made by the division engineer, lower Mississippi Valley division, by first indorsement dated March 29, 1949 (LMVRC).

(f) Assignment of the survey on the Lafourche-Jump Waterway to the division engineer, lower Mississippi Valley division, was made by letter from the Chief of Engineers dated April 24, 1952 (ENGWD); and assignment to the district engineer, New Orleans district, was made by the division engineer, lower Mississippi Valley division, in first endorsement dated April 30, 1952 (LMVGN). The combining of the survey on Lafourche-Jump Waterway with the survey on Bayou Lafourche was authorized at this time.

SCOPE OF SURVEY

2. The principal items of survey consisted of centerline soundings in Bayou Lafourche with cross sections between Larose and the jetties at Belle Pass; centerline soundings in Grand Bayou Blue with cross sections; visual reconnaissance of Bayou Lafourche and the new channel routes at readily accessible points; and of the Lafourche-Jump route. Office studies were made of maps, charts, and prior reports on the waterways. The economic survey included a study of shrimp-ing, trapping, towing, oyster, oil exploration and oil drilling industries, as well as consultation with the following agencies and interested parties:

- (a) Louisiana Department of Public Works.
- (b) Louisiana Department of Wild Life and Fisheries.
- (c) U.S. Fish and Wildlife Service.
- (d) American Waterways Operators, Inc.
- (e) Police jury, parish of Lafourche.
- (f) Police jury, parish of Jefferson.
- (g) Police jury, parish of Plaquemines.
- (h) Shrimp and oyster companies.
- (i) Oil companies.
- (j) Towing companies.

DESCRIPTION

3. Bayou Lafourche was, prior to its closure at its head by local interests in 1903-04, a distributary of the Mississippi River, leaving the parent stream at Donaldsonville, 176 miles above the Head of Passes of the Mississippi River. Bayou Lafourche follows a generally southerly direction for a distance of 107 miles to enter the Gulf of Mexico through the jettied channel of Belle Pass, which lies about

65 miles west of Southwest Pass of the Mississippi River. The other mouth of Bayou Lafourche, Pass Fourchon, is not used by navigation owing to its being blocked by natural deposit of littoral drift. Bayou Lafourche is a typical alluvial distributary with high banks that slope gently toward the swamps. Bank elevations in the vicinity of Donaldsonville are 20-22 feet mean sea level and gradually decrease as the bayou nears the gulf. At Golden Meadow bank elevations are 3-4 feet, and only 2 feet at Belle Pass. In the 56-mile reach between Donaldsonville and Lockport the total width of the alluvial ridges varies from 4 to 8 miles. At Lockport the width of the alluvial ridges is about 2 miles, while at Cut Off (mile 35) it is about one-half mile. Below Cut Off the width of the alluvial ridges decreases rapidly, and at Golden Meadow they are only about 300 yards wide. Below Golden Meadow the ridges gradually decrease and merge into the surrounding marshland. Louisiana Highways Nos. 18 and 308, and the Texas & Pacific Railway cross the bayou on earth fills at miles 106.75, 106.44, and 106.34, respectively. These fills were constructed subsequent to the construction of the dam at mile 107.

4. From mile 106.34 at Donaldsonville to Napoleonville, mile 90, the bayou has a controlling depth of 2 feet and a water surface width of approximately 70 feet. Napoleonville is the head of navigation and of the existing 6-by 60-foot Federal project. From Napoleonville to Thibodaux, mile 72, the controlling depth is 3.5 feet below mean gulf level over a bottom width of 60 to 80 feet. From Thibodaux to Lockport, mile 51, the controlling depth is 4.5 feet over a bottom width of 80 feet. From Lockport to Larose a minimum depth of 7 feet exists over a bottom width of nearly 100 feet. Below Larose (mile 39.56 through mile 0) minimum thalweg depths of 9 feet prevail, but narrow bottom widths of deep water make passing difficult and hazardous. Plate 2 shows the channel profile along Bayou Lafourche.

5. While pile and stone jetties have been constructed at the mouth of Belle Pass they have not always been adequate to maintain the channel. A clear width of 190 feet exists between jetties and controlling depth is about 6 feet. Lack of maintenance during the war years permitted erosion of the shore at the inshore ends of the jetties and caused almost complete blocking of the channel by storm action. In 1947 the inshore ends of the jetties were extended shoreward and the jetties were strengthened in 1952-53. The channel dimensions between the jetties were reestablished as a result of this work.

6. Bayou Lafourche is now a tidal stream with a water surface variation of about 1 foot at the mouth. Hurricanes have raised the gulf level at its mouth as much as 10 feet. The frequency of hurricanes on this coastal area is about one in 7 years, and the generally accepted hurricane season is from the middle of August through the first week in October. Stormy northerly winds, which are prevalent in the fall, winter, and early spring, have depressed it as much as 3 feet. The only record of water elevations on Bayou Lafourche is from the gage at Thibodaux which was established July 28, 1949, and which is read only intermittently. The highest reading recorded was 4.8 feet above mean sea level on March 29, 1951. The lowest reading was 0.1 foot mean sea level on October 28, 1952, and January 13, 1953. No discharge records exist.

7. After closure of Bayou Lafourche at the Mississippi River, some local drainage was diverted through canals into the bayou in an effort

to supply fresh water to the bayou. Water fluctuations on the upper reaches of the bayou were caused almost entirely by rainfall. Approximately 300 square miles of cultivable land along the bayou were drained in this manner. Flow in the bayou was entirely dependent on local rainfall until May 1955, when pumps and siphons were placed in operation at Donaldsonville, La., to supply Mississippi River water into Bayou Lafourche to eliminate pollution and to supply municipal and industrial water. In order to confine the river water to Bayou Lafourche it was necessary to close drainage canals discharging into the bayou.

8. The Intracoastal Waterway which crosses Bayou Lafourche at Larose (mile 39.56) is the most important connecting waterway, affording a 12- by 125-foot channel for barge traffic moving east and west. Formerly the Intracoastal Waterway entered Bayou Lafourche from the east at Larose and utilized the bayou to Lockport (mile 51) as a part of the then 9- by 100-foot project. At Lockport the Intracoastal Waterway turned west. With the dredging (in 1943-44) of the Bourg-Larose Cutoff of the Intracoastal Waterway, Bayou Lafourche no longer forms a part of that waterway.

9. At Leeville (mile 13.0) Bayou Lafourche is crossed by the Southwest Louisiana Canal which provides a connection 8 feet deep over a bottom width of about 80 feet to Caminada and Barataria Bays to the east, and to Timbalier and Terrebonne Bays to the west. Private Interests have marked channels through Timbalier and Caminada Bays with an adequate number of buoys and these channels are closely followed by vessels and tows with the result that the channels have deepened to about 7.5 feet. Prior to September 1950 the Southwest Louisiana Canal was a privately owned toll canal, but ownership was acquired by the State of Louisiana and tolls were discontinued. Gray's or Fisherman's Canal enters Bayou Lafourche through the west bank at mile 9.5 providing a toll-free 5- by 40-foot connection to Bayou Blue and Lake Racourci.

10. Havoline Canal enters Bayou Lafourche through the west bank at mile 6.0, and provides a toll-free 5- by 40-foot connection to Timbalier and Terrebonne Bays.

11. Reference is made to quadrangle maps of the area published by the Department of the Army and the Department of the Interior (U.S. Geological Survey); to U.S. Coast and Geodetic Survey charts Nos. 1050 and 1274; and to plates 1 and 2 accompanying this report.

TRIBUTARY AREA

12. The alluvial ridges along Bayou Lafourche are very fertile and are cultivated extensively from Donaldsonville to mile 26 near Golden Meadow. The principal crop is sugarcane; however, other agricultural products are corn, potatoes, turnips, and shallots. The annual sugarcane crop is approximately 1,700,000 tons, which is processed by 13 mills located along the bayou between Donaldsonville and Valentine. The annual production of these mills is approximately 141,500 tons of raw sugar, 23,200 tons of refined sugar; and 9,521,000 gallons of molasses. About 21,000 tons of raw sugar from mills on Bayou Terrebonne and Bayou Teche are refined at Mathews. Bagasse, the fiber remaining after extraction of the juice from the sugarcane, is baled and shipped to plants where it is made into wallboard, insulating material, and paper.

13. From Donaldsonville to Leeville both banks of the bayou are lined with buildings and small communities, and this is considered the most densely populated rural section in Louisiana. The estimated population of the tributary area is 58,500. The principal towns along Bayou Lafourche and their 1950 populations are as follows:

Town	Population	Town	Population
Donaldsonville.....	4,150	Lockport.....	1,373
Napoleonville.....	1,232	Larose.....	2,500
Thibodaux.....	7,733	Golden Meadow.....	2,820
Raceland.....	2,000		

14. Between Larose and Golden Meadow a gradual transition occurs in which agricultural pursuits are replaced by fishing activities. Shrimp is the most important fishery in the area, with oysters next in importance. Crabs are also taken in commercial quantities and a small amount of market fish are caught.

15. Crude oil is produced from several fields located along the length of the bayou and extensive exploration for new producing areas is continually taking place. The annual production of the principal oilfields in the vicinity of Bayou Lafourche are shown in table 1.

TABLE 1.—Crude oil production along Bayou Lafourche

[In barrels]

Field	1946	1947	1948	1949	1950
Bay Marchand.....				397,153	1,988,035
Bully Camp.....	252,582	306,003	287,264	272,960	338,982
Golden Meadow.....	2,410,891	2,684,354	3,499,756	4,158,964	5,014,856
Lafourche crossing.....	99,945	61,927	65,569	49,705	59,277
Lake Racourci.....				14,898	42,581
Leeville.....	1,380,864	1,576,735	1,813,319	1,924,816	2,106,658
Napoleonville.....	208,026	189,010	213,529	243,151	258,138
Timbalier Bay.....	24,494	26,760	11,194	18,781	55,529
Valentine.....	177,052	203,625	273,757	413,518	524,440
	1951	1952	1953	1954	1955
Bay Marchand.....	2,434,410	2,007,029	1,559,276	2,430,210	2,231,680
Bully Camp.....	878,826	1,249,123	1,637,551	1,351,757	1,771,594
Golden Meadow.....	4,846,525	4,453,077	3,884,262	3,962,606	3,773,922
Lafourche crossing.....	44,936	28,610	31,617	7,535	126,857
Lake Racourci.....	34,544	168,900	426,893	386,158	346,983
Leeville.....	2,205,446	2,428,909	3,257,579	3,556,130	4,089,502
Napoleonville.....	413,228	449,265	524,101	496,206	612,290
Timbalier Bay.....	370,430	1,733,999	2,512,210	2,289,205	3,939,840
Valentine.....	649,781	906,110	1,261,421	1,399,389	1,761,090

16. Oil produced in the Bay Marchand, Bully Camp, Lake Racourci, Napoleonville, Timbalier Bay, and Valentine fields is not moved via Bayou Lafourche but is handled either by pipeline to refineries or over other waterways.

17. Industries in the area other than sugar and oil consist of feed and meal plants, sawmills, seafood, and vegetable processing plants, moss gins, small manufacturing plants for farm machinery, shipyards, machine shops, wholesale houses, and ice and cold storage plants. Railroad transportation in the area is provided by the Texas & Pacific Railway and by the Southern Pacific Railway. The Texas & Pacific main line crosses Bayou Lafourche at Donaldsonville, and a branch line runs down the east bank of Bayou Lafourche from Donaldsonville to Thibodaux. The Southern Pacific main line crosses Bayou

Lafourche at Lafourche crossing, with two branch lines, one from Raceland down the east bank of Bayou Lafourche to a point below Lockport, and the other extending from Schriever along the west bank to Napoleonville.

18. Improved highways are located on each side of Bayou Lafourche. Louisiana State Highway No. 308, along the east bank from Donaldsonville to Golden Meadow is gravel, shell, or asphalt surfaced. The highway along the west bank of the bayou from Donaldsonville to Leeville is concrete. At Leeville this highway crosses the bayou and continues to Grand Isle where it terminates. At Raceland both of these highways connect with U.S. Highway No. 90. Junctions with other State highways are made at Thibodaux and Donaldsonville. Numerous rural roads also connect with the highways.

19. The coastal area lying between Bayou Lafourche and the Mississippi River, through which the Lafourche-Jump Waterway would pass, is low-lying marshland. The only settlements are at Leeville on Bayou Lafourche at the western end of the waterway; at Grand Isle; and at Venice at the eastern end of the waterway. While the territory is marshland, with numerous bays and bayous, it contributes substantially to the local and national economy. The region produces a considerable quantity of shrimp and oysters, and supports a sizable fishing industry based on these two seafoods. Crabs and fish are taken throughout the area in commercial quantities.

20. Grand Isle, a settlement of about 600 permanent residents, is host to thousands of visitors during the year and is the terminus of State Highway No. 1. The excellent deep-sea fishing available in the Gulf of Mexico immediately offshore is probably the most attractive lure of Grand Isle. The gently sloping sand beach provides safe bathing in the gulf and attracts many people, while the inland fishing in the numerous bays and bayous attracts many others. The Grand Isle Tarpon Rodeo held annually during July has steadily grown and in 1956 approximately 1,600 registered contestants competed for the expensive prizes offered for the catching of record fish in 11 species in addition to tarpon. Approximately 390 boats ranging from outboard hulls to 90-foot yachts participated in 1956. Private interests have dredged about 3 miles of Bayou Rigaud to provide a 12- by 125-foot channel, and constructed wharves, slips, and other marine facilities along the banks.

21. Venice, located on the Mississippi River at the eastern end of the Lafourche-Jump Waterway, is at the end of State Highway No. 23 and has a population of about 500.

22. The coastal area between Bayou Lafourche and the Mississippi River is a potential area for the development of oil and gas fields. There are a number of oilfields located in the area which now are producing gas and oil, and extensive oil exploration is continually taking place. The annual production of petroleum from these various fields is shown in table 2.

TABLE 2.—*Crude oil production along Lafourche-Jump waterway*

{In barrels}

Field	1946	1947	1948	1949	1950
Bay de Chene.....	72,904	92,818	274,795	368,787	818,913
Queen Bess Island.....	5,315	4,815	1,429		
Grand Isle block 16.....			20,530	146,374	308,591
Grand Isle block 18.....					
Lake Washington.....	178,554	190,348	144,234	150,160	175,901
Bastian Bay.....	316,060	342,086	339,766	302,758	340,273
West Bastian Bay.....					
Venice.....	3,033,316	3,635,452	4,178,266	4,613,807	5,017,472
West Bay.....	1,251,824	1,700,636	2,095,571	2,266,251	2,403,057
	1951	1952	1953	1954	1955
Bay de Chene.....	1,260,425	1,288,673	1,301,855	1,205,001	1,456,895
Queen Bess Island.....	150	222	705	257	11,121
Grand Isle block 16.....					
Grand Isle block 18.....	467,381	483,139	385,304	736,660	1,394,356
Lake Washington.....	365,992	430,870	971,974	1,993,900	4,725,353
Bastian Bay.....	389,292	385,137	361,263	376,038	314,714
West Bastian Bay.....					
Venice.....	5,745,882	5,962,247	5,727,073	5,364,575	4,903,212
West Bay.....	2,934,212	3,053,957	3,133,833	2,524,966	2,425,284

23. Oil produced in the Venice and West Bay Fields is handled by pipeline to terminals on the Mississippi River for movement to refineries by tanker.

24. The only access to the interior area between Bayou Lafourche and the Mississippi River is by water. Highways provide access along Bayou Lafourche to Grand Isle, and along the Mississippi River to Venice. The New Orleans & Lower Coast Railroad terminates at Buras, La., on the Mississippi River about 14 miles upstream from Venice.

BRIDGES

25. Bridges which cross Bayou Lafourche are shown in table 3. Twenty-two pipelines and four cable crossings will require lowering in order to deepen the channel (app. A, sheet 6).

TABLE 3.—*Bridges crossing Bayou Lafourche*

Number	Location	Type	Clearance in feet		Type of traffic	Owner	Plans approved by WD	Miles above mouth
			Horizontal	Vertical				
1	Palo Alto	Wood deck, steel truss, swing	91.5	13.1	Highway	Palo Alto Co.		103.0
2	Belle Rose	Wood deck, fixed	14.0	15.0	do	Louisiana Highway Commission		100.0
3	Paincourtville	do	14.0	15.9	do	do		95.0
4	Napoleonville	do	14.0	15.0	do	Emile Campo		94.0
5	do	Steel truss, swing	57.0	8.7	Railroad	Texas & Pacific RR	Aug. 20, 1917	90.3
6	do	Remove steel span	50.0	16.0	Highway	Louisiana Highway Commission	May 23, 1946	89.9
7	do	Steel pontoon, wood deck, pontoon	55.0	do	do	do	Sept. 28, 1935	86.0
8	Labadieville	Remove steel span	50.0	11.6	do	do	Mar. 7, 1950	81.0
9	Thibodaux	Steel truss, swing	50.0	5.6	Old tram converted to high way	Caldwell Sugars	Oct. 25, 1926	76.0
10	do	Steel pontoon, wood deck, pontoon	75.0	do	Highway	Lafourche Parish	Sept. 8, 1922	75.0
11	do	Steel truss, concrete abutment, vertical lift	50.8	14.1	do	Louisiana Highway Commission	Sept. 28, 1935	72.0
12	Lafourche	Steel truss, swing	70.5	22.8	Railroad	Southern Pacific RR	July 29, 1899	68.0
13	do	do	60.0	10.1	Highway	Louisiana Highway Commission	Aug. 19, 1947	65.0
14	Raceland	Vertical lift	61.9	10.5	do	do	May 21, 1935	57.0
15	Mathews	Steel pontoon, wood deck, ponton	95.0	do	do	do	Sept. 5, 1941	54.0
16	Lockport	Steel truss, swing	85.0	15.8	do	do	Aug. 17, 1939	50.0
17	Valentine	Steel pontoon, wood deck, pontoon	90.0	do	do	Lafourche Parish	June 9, 1950	44.0
18	Larose	do	77.0	do	do	Louisiana Highway Commission	Nov. 13, 1936	38.0
19	Cut Off	do	90.0	do	do	Lafourche Parish	June 9, 1950	35.0
20	do	do	90.0	do	do	do	May 22, 1951	33.0
21	Golden Meadow	do	89.0	do	do	do		27.0
22	do	do	84.0	do	do	Louisiana Highway Commission	Aug. 11, 1950	23.0
23	Leeville	Steel truss, swing	51.7	11.9	do	do	July 7, 1931	13.0

26. The only bridge crossing the proposed Lafourche-Jump Waterway is the one crossing Bayou Lafourche at mile 13.0.

PRIOR REPORTS

27. Prior reports on Bayou Lafourche are listed below:

Date	Character	Recommendation of Chief of Engineers	Published
Oct. 8, 1845	Preliminary examination.....	Unfavorable.....	S. Ex. 67-34-1.
Oct. 5, 1874	Survey.....	do.....	A.R. 1874.
Aug. 30, 1882	Preliminary examination.....	Favorable.....	S. Ex. 151-47-1.
July 8, 1886	Survey.....	Favorable.....	A.R. 1886.
Mar. 19, 1889	Preliminary examination.....	Favorable.....	A.R. 1889.
Dec. 21, 1911	do.....	Unfavorable.....	H. 1102-62-3.
Apr. 15, 1918	Survey.....	do.....	Not published. Do.
Feb. 16, 1931	Preliminary examination.....	Favorable.....	H. 45-73-1.
Sept. 26, 1932	Survey.....	(¹)	Not published. Do.
Dec. 11, 1933	Preliminary examination and survey.....	Unfavorable.....	Do.
May 1, 1933	Review.....	do.....	Do.
Oct. 4, 1948	Preliminary examination.....	Favorable.....	Do.

LOCK AT HEAD OF BAYOU LAFOURCHE

May 31, 1916	Preliminary examination.....	Favorable.....	Not published.
Feb. 24, 1917	Survey.....	Unfavorable.....	Do.

PLAQUEMINE-MORGAN CITY ROUTE COMBINED WITH BAYOU LAFOURCHE

Sept. 4, 1941	Survey.....	Unfavorable.....	Not published.
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¹ Modification of project recommended; subject to local cooperation.

28. The only portion of the Lafourche-Jump Route on which prior reports have been submitted is that section which utilizes Bayou Rigaud. Those prior reports concerning Bayou Rigaud are shown below:

Date	Character	Recommendation of Chief of Engineers	Published
Oct. 18, 1915	Preliminary examination.....	Unfavorable to Bayou Rigaud.	H. 200-65-1.
Mar. 1, 1917	Survey.....	do.....	H. 200-65-1.
Dec. 2, 1935	Preliminary examination.....	Unfavorable.....	Not published. Do.
Jan. 2, 1936	do.....	do.....	Do.
Oct. 29, 1948	do.....	Favorable to Bayou Rigaud.	Do.

29. While these reports dealt primarily with the Barataria Bay Waterway (a 5 by 50-foot Federal project) they also covered the eastern portion of Bayou Rigaud. A preliminary examination of the Lafourche-Jump Waterway dated August 31, 1951, was favorable, but has not been published.

EXISTING PROJECT

30. The original project for Bayou Lafourche was adopted by the River and Harbor Act of June 18, 1878 and provided for improvement by the removal of obstructions. A revised project based on the report of Lt. O. T. Crosby, dated June 11, 1886, was adopted by the River and Harbor Act of August 11, 1888. The revised project provided for construction by local interests of a lock at the head of the

bayou where it originally left the Mississippi River at Donaldsonville, and a channel 75 feet wide and 5 feet deep at extreme low water throughout the bayou. The act of September 23, 1896, provided for holding the local construction of the lock in abeyance and the restriction of Federal operations to maintenance of low water navigation in the upper reaches of the bayou by dredging. Subsequent annual State appropriations were not sufficient to initiate construction of the lock. Adoption of the existing project by the River and Harbor Act of August 30, 1935 (H. Doc. 45, 73d Cong., 1st sess.) relieved the joint organization of the Atchafalaya and Lafourche levee boards of all responsibility in connection with Bayou Lafourche. Total Federal expenditures under prior projects amounted to \$268,380.86, of which \$252,935.48 was for new work, and \$15,445.38 was for maintenance.

31. The existing project provides for the permanent closure of the head of Bayou Lafourche without a lock; a channel 6 feet deep and 60 feet wide from Napoleonville to the Intracoastal Waterway at Lockport, and a channel of the same dimensions from the Intracoastal Waterway at Larose to the Gulf of Mexico via Belle Pass; the closure of Pass Fourchon and for a jettied entrance at the mouth of Belle Pass. The total length of improvement is about 79 miles. Bayou Lafourche between Lockport and Larose has been improved, as a part of the Gulf Intracoastal Waterway, to provide a 9 by 100 foot channel, and its maintenance to these dimensions is still authorized. The present 12 by 125 foot waterway now only crosses Bayou Lafourche at Larose. Total Federal cost to June 30, 1956, was \$838,682, of which \$271,089 was for new work and \$567,593 for maintenance. The latest (1952) approved estimate for annual maintenance is \$50,000.

LOCAL COOPERATION ON EXISTING AND PRIOR PROJECTS

32. Before Bayou Lafourche was separated from the Mississippi River it was necessary for local State levee boards to construct and maintain levees on both banks of the bayou to prevent overflow of adjacent lands during floods on the Mississippi River. To relieve the State of Louisiana of the cost of enlarging and maintaining approximately 150 miles of levee, the River and Harbor Act of June 13, 1902, authorized the joint organization of the Atchafalaya and Lafourche levee boards to close the bayou at its head for a period of 2 years and 6 months; with the understanding that the two boards would maintain a 6 by 60 foot channel and a corresponding amount of fresh water through Bayou Lafourche, and would provide a lock to permit passage of vessels between the bayou and the Mississippi River. The joint board was unable to finance construction of the lock, and successive River and Harbor Acts extended the time for completion of the lock until a final extension date of July 1, 1917. During this time considerable dredging and hyacinth removal was accomplished by local interests, but the joint board never attempted to build the lock. Records of the State board of engineers and local interests (the joint organization of the Atchafalaya Basin Levee District and the Lafourche Levee District, and the State board of engineers) show that approximately \$1,588,000 was expended in the 50-year period from 1890 to 1940. The joint organization expended \$1,366,000 of which \$1,117,500 was for levee construction and \$248,500 was spent for dredging, closing Bayou Lafourche by means

of a dam at the Mississippi River at Donaldsonville, and furnishing fresh water to the bayou. The State board of engineers furnished \$222,000 of the total for levee construction.

33. Local cooperation on Bayou Lafourche was not required by the River and Harbor Acts prior to that of August 30, 1935, which authorized the existing project. Under the existing project local interests were required to provide suitable areas for spoil disposal during initial construction and future maintenance. Spoil disposal areas were provided by local interests; however, the areas furnished in the reach between Napoleonville and Lockport are from 2 to 3 miles from the bayou. Bids received for dredging this section have always been excessive and have been rejected. Local interests have been requested to furnish spoil disposal areas more favorably located.

34. No project exists on the Lafourche-Jump Waterway, and, consequently, there has been no need for local cooperation.

OTHER IMPROVEMENTS

35. Local interests have dredged and maintained many canals which enter Bayou Lafourche. Harvey Canal No. 2 entering from the east at Larose and that portion of the Company Canal entering from the west at Lockport were purchased by the Federal Government and enlarged as part of the Intracoastal Waterway. Company Canal east of Lockport has been abandoned for years. The costs of these improvements are not available. In addition to these channel and wharf improvements, numerous canals have been dredged to service oil-fields, drilling locations, and pipelines. The costs of these improvements are not available.

36. Local interests have recently installed and placed in operation pumps and siphons at the head of Bayou Lafourche at Donaldsonville, La., so that water from the Mississippi River can be introduced into the bayou to relieve pollution and be used for industrial or municipal purposes. The cost of this work was approximately \$1,100,000.

37. In the area traversed by the Lafourche-Jump Waterway, oil companies and other interests have dredged and maintained numerous canals of varying depths and lengths. In about 1921 local interests attempted to improve the eastern end of Bayou Rigaud, but abandoned the task because of inadequate dredging equipment. In January of 1947 the Humble Oil & Refining Co. spent about \$75,000 in dredging a 12 by 200 foot channel 7,200 feet across the offshore bar of Barataria Pass to the 12-foot contour in the Gulf of Mexico; and in dredging a 12 by 125 foot channel in Bayou Rigaud for a distance of about 3 miles. They have also spent about \$50,000 constructing storage tanks and wharfage facilities at this dock and turning basin. Local interests have also dredged the Southwest Louisiana Canal which crosses Bayou Lafourche at Leeville; Gray's or Fiserman's Canal which enters Bayou Lafourche through the west bank at mile 9.5; and Havoline Canal which enters Bayou Lafourche from the west at mile 6.0. In addition to dredging these canals private interests have marked channels through Timbalier and Caminada Bays with an adequate number of buoys these channels are closely followed by vessels and tows with the result that the channels have deepened to about 7.5 feet. Numerous canals to service oilfields, drilling locations, and

pipelines have been dredged in the area. The costs of these works are not available.

TERMINAL AND TRANSFER FACILITIES

38. Crude oil loading facilities exist at Lafourche Crossing. The Barker Barge Line maintains a large wharf at Lockport as well as modern boat building and repair facilities. The Southern Pacific Railroad has a general commodity wharf about 400 feet long at Lockport. An ice plant also maintains a wharf at Lockport. Wharves and loading facilities for drilling mud for oil wells are maintained at Lockport by two mud supply companies. Marine repair and wharf facilities are located about 3 miles south of Lockport. Crude oil loading facilities are located at Valentine.

39. Between Larose and Leeville many seafood processing plants, oil, and transportation companies maintain wharf facilities on Bayou Lafourche. Numerous small private wharves as well as marine ways and repair facilities for the many fishing vessels are located along both banks. Oil companies have established operating bases at Leeville for both offshore and inshore oilfield development.

40. Transportation to and from all wharves along Bayou Lafourche is available by highway, and for that section of the bayou from Lockport north, railroad transportation is also available.

41. Along the route traversed by the Lafourche-Jump Waterway wharf facilities are located at Cheniere Caminada, Grand Isle, and Venice, where highway transportation is available. At Cheniere Caminada there is about 500 feet of wharfage, used primarily for shrimping vessels, but which is also available for mooring visiting boats, refueling, and securing supplies. Other wharves are also located at this point for the use of fishing vessels. On the north shore of Grand Isle, at its eastern end, three privately owned wharves having a total about 2,500 feet of wharfage are available to all boats, without charge, for landing and purchasing gasoline, oil, and supplies. Oil companies have constructed for their own use 517 feet of wharfage and three slips with boat pens for mooring their smaller craft. The shrimping industry has constructed a total of 810 feet of wharfage in Bayou Rigaud at Grand Isle, together with a slip for mooring fishing vessels. A recently completed slip provides mooring space for over 100 vessels. Oil companies and private owners have constructed wharves at Venice.

42. Oil companies have constructed wharves at the oilfields which are located in the area, and the U.S. Coast Guard plans to erect a wharf and boathouse on Bayou Rigaud at Grand Isle.

43. Additional wharf facilities are not considered necessary for the proposed Bayou Lafourche improvement as existing facilities are adequate for present and reasonably prospective commerce. Public terminal facilities are not necessary at the present time as all commerce is conducted by individual firms and handled over their own facilities.

IMPROVEMENT DESIRED

44. (a) Five public hearings have been held by the New Orleans district engineer to consider the desires of local interests concerning Bayou Lafourche and the Lafourche-Jump Waterway.

(b) *March 18, 1947, in Donaldsonville.*—Supply of fresh water and a lock at Donaldsonville were the principal topics discussed relative to Bayou Lafourche. The chief engineer of the Department of Public Works, State of Louisiana, requested that Bayou Lafourche be improved to a depth of 9 feet from Larose to the Gulf of Mexico; however, this deepening of Bayou Lafourche was not discussed. A record of this hearing was submitted with the preliminary examination report dated October 4, 1948.

(c) *March 20, 1947, in Westwego.*—Local interests requested that the eastern portion of Bayou Rigaud be dredged to provide additional mooring facilities and a harbor of refuge. A request was also made for a navigable connection from the Intracoastal Waterway to Grand Ecaillle and from Grand Ecaillle to the waterway from Empire to the Gulf of Mexico. A record of this hearing was also submitted with the preliminary examination report dated October 4, 1948. Consultation with transportation and fishing interests after the public hearing developed the advisability of revising and extending the navigation channel requested so as to form a continuous water route from Bayour Lafourche at Leeville to and through Bayou Rigaud and the vicinity of Grand Ecaillle to the Mississippi River at the Jump.

(d) *July 20, 1948, in Golden Meadow.*—This hearing considered applications for permits to construct wharves and buildings along Bayou Lafourche below Larose. A spokesman for the police jury of Lafourche Parish recommended an auxiliary channel to bypass the congested area of Bayou Lafourche (Larose to Leeville). The alternate route suggested was to leave Bayou Lafourche at Leeville follow a northerly course utilizing Grand Bayou Blue for a large portion of its length, and connect with the Gulf Intracoastal Waterway at mile 37.2 west of Harvey lock.

(e) *June 14, 1949, in Raceland.*—Introduction of fresh water into the head of Bayou Lafourche and the improvement of the lower reaches of the bayou in the interests of navigation (including the auxiliary route via Grand Bayou Blue) were proposed. The hearing was attended by 160 people representing business interests, civic organizations, and local, State, and Federal agencies. A petition signed by 311 residents of the area was submitted in support of the improvement of the existing Bayou Lafourche channel. The petition requested that Bayou Lafourche be enlarged from Larose to the 9-foot contour in the Gulf of Mexico to provide a 9- by 80-foot channel. A Louisiana State senator from Lafourche Parish advocated improvement of the existing channel in Bayou Lafourche to a 9- by 80-foot waterway and opposed construction of the auxiliary channel on the ground that additional bridges would be required and that merchants along the bayou would be likely to lose business now enjoyed from towing interests. Subsequent to the hearing several communications which favored the auxiliary route were received.

(f) *January 7, 1953, in Golden Meadow.*—The purpose of this hearing was to redetermine the views and desires of local interests relative to the further improvement of Bayou Lafourche, the provision of an auxiliary channel to bypass the congested area of Bayou Lafourche between Larose and Leeville, and the provision of a navigable connection from Bayou Lafourche at Leeville to the Mississippi River at the Jump. The hearing was attended by 59 persons representing business interests, civic organizations, and local, State, and Federal

agencies. Those present were unanimous in their desire for the improvement. Interests along Bayou Lafourche in the vicinity of Golden Meadow expressed a desire for the improvement of Bayou Lafourche to care for the increased tonnage, and if this proved to be impracticable because of the encroachment of highways, buildings, and wharves on the bayou, and in the event that Bayou Lafourche could not be improved sufficiently to care for the traffic, they requested that the Bayou Lafourche auxiliary channel be routed along the 40-arpent line on the west bank of Bayou Lafourche rather than follow Grand Bayou Blue. If excavation along the 40-arpent line proved to be excessively costly as compared to the route along Grand Bayou Blue, then local interests would as a final solution accept the route along Grand Bayou Blue as the auxiliary route. Representatives of the fur-trapping industry, particularly Louisiana Land & Exploration Co. and La Terre Co., Inc., expressed concern over the possibility of salt-water intrusion into their trapping lands along the route of the auxiliary channel. Their objections relative to trapping so coincide with the later reports (see apps. F and G) of the U.S. Fish and Wildlife Service that they are hereinafter considered a part thereof. All present were in favor of the proposed Lafourche-Jump improvement. The route utilizing the Southwest Louisiana Canal into Bayou Lafourche was favored, and it was requested that the route follow as closely as possible the north shore of Grand Terre Island. No request was made at this hearing for the introduction of fresh water into Bayou Lafourche as this problem was taken care of by local interests installing pumps and siphons at Donaldsonville, La., to put Mississippi River water into the bayou to relieve pollution, and for municipal and industrial purposes.

45. Subsequent to the hearing of January 7, 1953, the Louisiana Oyster Dealers & Growers Association, Inc., objected to dredging a canal from the Jump at Venice, La., to the waterway, Empire to the gulf, on the grounds that it would constitute a hazard to navigation and would cause the destruction of thousands of sacks of oysters in the area unless adequate control measures such as locks are employed at the south end of the waterway at or near Venice. A copy of their letter of August 13, 1953, appears as appendix E.

46. In view of the delay in completion of the report, occasioned by a reluctance of the responsible local interests to furnish a statement on local cooperation, a meeting was held with the responsible State and local interests and State legislators in Baton Rouge on June 12, 1956, to consolidate local opinion and desires with respect to the project features that could be favorably considered. At this meeting all differences were resolved and local representatives and the State were in agreement on the features to be incorporated in the recommended plan of improvement. Resolution approving the plan was supplied under date of August 8, 1956.

47. Records of the hearings at Raceland and Golden Meadow, June 14, 1949, and January 7, 1953, respectively, are forwarded with this report.

COMMERCE

48. Very little commerce is carried on over the reach of Bayou Lafourche above Lockport. Bayou Lafourche below Lockport is a navigable waterway of considerable importance. Traffic over Bayou Lafourche since 1930 is shown in table 4.

TABLE 4.—Commerce on Bayou Lafourche

Year	Total tons	Crude oil	Fuel oil	Oysters	Shells	Shrimp	Sugar	Sugarcane	Sulfur	Water	Other
1930.	210,788	54,048	26,181	5,551	560	1,487	3,857	91,300			27,804
1931.	143,369	21,177	11,003	3,239		3,500	522	74,391			29,537
1932.	138,462	20,403	10,907	2,114	600	1,653	908	93,024			8,853
1933.	109,958	1,200	13,763	3,023		1,372	7,574	76,470			6,556
1934.	792,265	672,263	10,004	3,794		1,094	12,885	75,696			5,000
1935.	899,379	744,958	5,866	358	1,999	966	12,159	76,962			6,300
1936.	882,522	683,443	39,859	323	33,800	382	16,716	82,730			500
1937.	870,522	543,215	59,394	1,713		2,519	16,092	89,203		113,179	45,207
1938.	914,704	558,861	39,310	4,984	79,738	4,906	24,422	66,355			80,769
1939.	756,043	472,142	40,315	1,860	56,362	1,244	25,191	47,615			88,984
1940.	1,166,255	870,857	25,631	1,922	26,275	1,712	46,946	26,845			144,543
1941.	1,253,570	1,050,677	6,024	889	115,979	2,023	23,477	13,302			25,136
1942.	933,209	866,710	4,726	635	11,575	1,975	24,630	12,130			10,528
1943.	1,089,702	1,025,069	1,714	1,145	5,981	4,650	16,690	17,220			17,233
1944.	761,872	639,954	2,151	3,842	56,549	4,669	19,400	15,760			19,547
1945.	684,578	548,997	454	4,159	98,688	3,933		13,266			15,081
1946.	849,431	680,735		4,807	123,503	5,716		6,202			28,468
1947.	878,929	534,684	7,033	11,610	244,037	5,951	12,157	7,909			452
1948.	1,380,912	969,505	13,812	9,105	298,297	5,641	18,578	5,302			252
1949.	1,831,065	1,550,875	17,444	16,082	143,450	(1)	21,223				(2) 81,991
1950.	2,182,289	1,928,450	18,252	15,004	91,305	(1)	26,884				9,197
1951.	2,279,685	1,888,872	15,021	21,227	125,872	(1)	29,639				86,002
1952.	1,946,442	1,558,379	17,646	16,528	124,230	(1)	35,830		4,417		56,610
1953.	2,216,534	1,695,014	21,834	20,563	139,368	(1)	35,842		111,011		33,955
1954.	897,072	100,648	23,607	20,372	246,697	(1)	36,055		149,173		158,947
1955.	1,179,172	112,068	52,498	7,778	204,980	(1)	51,156		187,125		227,635
											* 385,355

¹ Included with oysters.² Included with "Other."

* Major items are: Ice, 51,731; mud, 114,089; cement, 82,583; and steel, 59,321.

49. The principal tonnage items carried over Bayou Lafourche are shells, sulfur, water, mud, crude oil, cement, and steel. Shells for road construction and repair, as well as for filling in and around the oilfield facilities, is an item of quantity in the tonnage figures. Shells usually are moved from points east of Bayou Lafourche to various points along the bayou as occasion demands. Crude oil is being moved to refineries to the west of Bayou Lafourche. Water, mud, cement, and steel are moved over Bayou Lafourche for use in oilfield operations. This tonnage originates primarily from Harvey, Houma, and Morgan City at which points large supply yards are located. Some raw sugar is being moved from points west of Bayou Lafourche to Mathews and some refined sugar is being moved from Lockport to points up the Mississippi Valley.

50. While the tonnage of shrimp and oysters is small, the value is of appreciable amount and the two fisheries require use of a large number of boats and fishermen, and are major factors in the economy of the area.

51. Benefits have been estimated on the basis that, of the existing tonnages, a total of 168,000 tons of materials and supplies would be moved to the oilfields, and a tonnage of 61,320 tons of crude oil would be moved from the area. Savings are based on future development of 53,400 tons of oilfield materials and supplies additionally and an additional crude oil tonnage of 84,000 tons. The total tonnage on which present and prospective benefits are computed is 366,700 tons. Benefits were also estimated on 115,000 tons of sulfur and supplies but are not claimed at this time.

52. No figures are available on the traffic over the Bayou Lafourche-Jump Waterway as no navigable connection exists at the present time. Some water traffic moves to and from Bayou Lafourche by way of Southwest Louisiana Canal and connecting bays even though shallow depths prevail. This traffic is made up of shrimping and oyster vessels, oilfield supplies, crew vessels, sulfur, drilling rigs, derrick barges, and dredges. The Southwest Louisiana Canal carries approximately 300,000 tons of material annually, which is composed of sulfur, mud, cement, timber, steel, ice, shrimp, and oysters. The coastal area lying between Bayou Lafourche and the Mississippi River is important because of its resources in shrimp, oyster, crude oil, natural gas, and sulfur. The character of this area is low, coastal marsh, broken by numerous bayous and bays of shallow depth. The only means of ingress and egress is by water and because of the shallow depths of the existing waterways the area is most difficult to negotiate except by vessels of shallow draft. A definite need exists for a water route which will permit traversing the area in an east-west direction. Such a route would eliminate the long water travel now necessary to get into and out of the area. For example, the movement of a large piece of floating equipment from the delta area of the Mississippi River requires a long upriver haul to Harvey lock, then through the Intracoastal Waterway and then south by way of the Barataria Bay Waterway, or Bayou Lafourche. North-south transportation is furnished by Bayou Lafourche on the west (being considered for improvement of this report), and by the Barataria Bay Waterway in about the center (on which a survey report has recommended a 12 by 125-foot channel).

VESSEL TRAFFIC

53. Trips of vessels on Bayou Lafourche since 1930 are shown in table 5. Pipelines are not competitive with the barge transportation for the movement of crude oil in the early stages of development of oilfields. Only when the proven reserves and production of an oilfield become sufficiently great does the pipeline become competitive with water transportation. However, the cheaper the water transportation the greater must be the reserves and production to warrant the installation of a pipeline. Another factor which will tend to keep an amount of crude oil moving by water is that it is possible to reach markets not available through pipeline facilities. Such a change of market might be desirable because of price differentials or other reasons and the availability of economical waterway transportation will make such a change of market feasible. Oil that is free to move to the most attractive market often makes such changes.

TABLE 5.—*Trips and drafts of vessels on Bayou Lafourche*

Year	Trips			Net registered tons			Draft	
	Steam	Motor	Barge	Steam	Motor	Barge	Minimum least draft feet	Maximum deepest draft feet
1930	672	4,794	2,998	21,384	45,988	386,598	2 to 4	4 to 6
1931	210	3,600	2,926	11,636	43,930	451,360	2	6
1932	482	4,266	3,356	16,902	33,564	352,828	2	6
1933	212	2,520	1,870	13,224	31,340	291,606	2	6
1934	344	5,255	5,142	32,894	57,482	1,354,886	1	6
1935	438	5,133	6,112	41,542	55,954	1,463,856	2	9
1936	511	5,245	8,839	46,726	58,443	2,789,966	4	6
1937	218	7,035	6,271	12,618	77,773	1,935,732	2	6
1938	156	7,321	4,306	7,990	99,871	1,517,358	1 U-3	6 to 9
1939	72	4,285	3,315	6,594	73,908	1,190,004	1 U-3	6 to 9
1940	26	5,766	4,210	2,552	82,519	1,553,284	1 U-3	6 to 9
1941	16	5,182	4,488	964	88,587	1,869,500	1 U-3	6 to 9
1942	2	2,888	2,690	100	54,610	1,281,716	1 U-3	6 to 9
1943	8	5,008	3,168	32	83,284	1,392,550	1 U-3	6 to 9
1944	4	7,900	3,480	252	100,532	1,050,092	1 U-3	6 to 9
1945	None	7,606	3,092	-----	143,042	929,158	1 U-3	6 to 9
1946	3,024	3,168	-----	194,038	1,016,566	1 U-3	6 to 9	
1947	9,999	3,276	-----	216,153	1,048,275	1 U-3	6 to 9	
1948	14	12,780	5,499	4,262	200,816	1,594,056	1 U-3	6 to 9
1949	None	13,971	6,534	-----	310,051	2,017,364	1	8
1950	17,085	7,533	-----	278,893	2,808,201	1 U-3	7 to 9	
1951	23,165	9,262	-----	318,871	3,146,620	1 U-3	7 to 9	
1952	15,421	8,860	-----	287,474	2,841,784	1	9	
1953	26,322	8,744	-----	412,024	2,818,285	1	9	
1954	25,505	6,193	-----	398,560	1,220,690	1	9	
1955	17,839	7,169	-----	331,064	1,369,032	1	9	

¹U-3 indicates under 3 feet.

Louisiana Canal, and Grand Bayou Blue, and dredged canals into that field from Grand Bayou Blue. The dredged canals that run through the oilfields have depths of 7 feet. Grand Bayou Blue has depths of from 7 to 30 feet. A dredged connection from Grand Bayou Blue to the Southwest Louisiana Canal has a depth of 8 feet and the Southwest Louisiana Canal has a depth of 8 feet. The Southwest Louisiana Canal which crosses Bayou Lafourche at Leesville connects Bayou Lafourche and Grand Bayou Blue with Timbalier Bay on the west and Caminada Bay on the east. Both of these bays have large connections to the Gulf of Mexico and are salt water bays. The area to the west of Bully Camp Field is open to the gulf through Bayou Jean Lacroix which has its mouth in Lake Felicity. Cutoff Canal which connects with Bayou Jean Lacroix has a depth of 9 feet to Bayou Pointe au Chien. North of Bayou Pointe au Chien it has been dredged to 7 feet for a distance of 1.57 miles north to service an oilwell location in the marsh area about 1.2 miles east of Grand Bayou to which a 7-foot channel has been dredged. Grand Bayou Canal which extends northeasterly from Grand Bayou has a depth of 6 feet at Grand Bayou which depth gradually decreases to about 2 feet in the upper reaches of Bayou Blue near Larose. The marsh area to the west of Grand Bayou Blue along its lower reaches is interlaced with numerous bays, lagoons, and bayous, and is a salt-water marsh.

(c) The only major fishing activities in the area are confined to shrimp and oysters. The shrimp fishery conducts its operations in the Gulf of Mexico and the larger salt-water bays such as Timbalier, Caminada, and Barataria Bays. No large-scale fresh-water fishery is conducted in the area. Commercially important oysterbeds are located in the areas to the west of Grand Bayou Blue such as Lake Racourci, Bayou Blue, Timbalier Bay, Lake Felicity, and Lake Chien. Only three oysterbeds are located in the lower reaches of Grand Bayou Blue; however, the bayou in this reach has natural depths and widths to accommodate the proposed project and practically no dredging is required. These three beds are cultivated beds and not natural beds. In the State of Louisiana water bottoms along the gulf coast are leased by the State for the cultivation of oysters. If dredging were required through the bayou it would not necessarily mean that the three oysterbeds would be destroyed, as they could be transplanted to other water areas in the vicinity.

(d) Waterfowl inhabit the area, principally during the fall and winter months, and fur-bearing animals are also found in some quantity, particularly in the upper reaches. By the proper disposition of spoil the extent of the area suitable for waterfowl and fur animals could be increased.

(e) Salinity records in the Intracoastal Waterway at Larose reveal that bottom salinities are usually very low, remaining below 300 parts per million of chlorine for the largest portion of the year, with increases occurring in the fall usually from September through November. Since 1949, the earliest year of record, the bottom salinity at its greatest concentration was about 2,800 parts per million of chlorine, or about 280 grains per gallon. The period of maximum concentration usually prevails only for a short duration of about 2 to 3 weeks.

(f) The controlling depth at the mouth of Bayou Lafourche at Belle Pass is now 6 feet and depths in Bayou Lafourche from Bell Pass to Larose average about 9 feet over a bottom width of about 30 feet.

(g) The proposed improvement of Bayou Lafourche provides a 12- by 125-foot channel from the gulf to Leeville and a 9- by 100-foot channel from Leeville to Golden Meadow. Existing central depths from Leeville to the Gulf Intracoastal Waterway at Larose are 9 feet and from Leeville to the gulf about 7 feet. Existing depths of about 8 feet obtain in the Havoline Canal and in the Southwest Louisiana Canal entering Bayou Lafourche from the saline bays either side of the bayou. Deepening the lower bayou to 12 feet below Leeville therefore will not importantly increase existing saline conditions in the waterways under study.

62. The Fish and Wildlife Service also expressed a fear that the construction of lateral canals from the navigation channel into the marsh by oil and sulfur interests would also endanger the area. These canals are being dredged at the present time without the encouragement of the proposed waterway, and will unquestionably continue to be dredged in the future. Property owners, if they so desire, have the prerogative of requiring these canals to be dammed at their mouths after completion of the operation or during the operation where possible.

63. The suggestions of the Fish and Wildlife Service are:

(a) The alternate navigation channel would follow the 40-arpent line from Larose to immediately below Golden Meadow, uniting with Bayou Lafourche at that point.

(b) The construction of a salt-water control structure near the lower end of the alternate navigation channel described in (a) above.

(c) Enlargement and maintenance of Bayou Lafourche from Golden Meadow to the gulf.

64. The police jury of Lafourche Parish has requested that the proposed channel not be considered along the 40-arpent route because of the complications in securing rights-of-way which would be brought about by the numerous small property owners involved. Excavation of the canal along the 40-arpent line is also considerably more expensive.

65. Turning the proposed channel into Bayou Lafourche just below Golden Meadow would involve cutting the main highway and the construction of a bridge with the attendant delay to highway traffic, a factor to which local interests have expressed strenuous objection.

66. Construction of a salt-water control structure at or near Golden Meadow on the route suggested would not protect the area with any degree of certainty. The salt-water control structure would be circumvented by dredged canals, as the area is honeycombed with bays, lagoons, and bayous, and the connection of dredged canals to any of these natural waterways would offset the protection afforded by the salt-water control structure. In addition to the dredging of canals the influence of nature in eroding away and enlarging the existing lagoons, bays, and bayous are gradually opening the area to salt-water intrusion. In addition the following comments are offered:

(a) It is believed that the dredging of the proposed canal through the existing bayou known as Grand Bayou Blue will not prove excessively harmful to the area.

(b) It would appear that the proper disposition of spoil along the eastern side of the proposed canal would increase the integrity of the marsh area to the east against salt-water intrusion rather than open

the area to intrusion of gulf waters. The disposition of spoil along the upper reaches could be conducted with the same view and thus the larger part of the area could be actually enhanced as a fresh-water marsh rather than adversely influenced. Any disposal of soil toward this end will have to be based on the wishes of the property holders and the Department of Wildlife and Fisheries of the State of Louisiana.

(c) Because of the reasons outlined above it is believed that adoption of the suggested measures for ameliorating adverse results of salt-water intrusion on fish and wildlife desired by the U.S. Fish and Wildlife Service is not warranted.

(d) The Lafourche-Jump Waterway, except for the eastern end, follows very closely along the gulf rim. The major portion of the area traversed is highly saline under present conditions. Inlets from the Gulf of Mexico allow the free encroachment of gulf waters, the most important inlets being Caminada Pass, Barataria Pass, Pass Abel, Quatre Bayou Pass, Chaland Pass, Grand Bayou Pass, Sandy Point, Tiger Pass, and Grand Pass.

(e) The Lafourche-Jump Waterway during periods of high water in the Mississippi River will provide additional fresh water to the area in the vicinity of the jump. During periods of low water the increase in salinity would be minor due to the present access routes for salt water.

(f) The salinity of the area between Sandy Point and Bayou Lafourche would remain unchanged as the route of the proposed waterway is very close to the sea rim, and existing inlets make the area a saline marsh.

(g) Dredging by bucket dredge would not be conducive to producing turbidity over an area large enough to have any detrimental results. Placement of spoil could be controlled so that surrounding areas would not be blanketed by a layer of silt as might be the case if hydraulic dredging was used.

(h) By careful routing the interference with existing oyster beds could be kept to a minimum. If it is necessary to cross existing beds it would be possible to transplant those beds to other locations.

(i) The tidal flow through the area would not be appreciably altered by the proposed waterway.

(j) The area traversed by that portion of the Lafourche-Jump Waterway between Bayou Lafourche and Barataria Pass which is recommended for construction is a saline marsh.

(k) Salinity values in the area would not be noticeably changed. Existing current patterns would not be appreciably altered.

(l) Routing of the waterway between Bayou Lafourche and Barataria Pass could be accomplished so as not to conflict with existing oysterbeds.

(m) Dredging by bucket dredge instead of hydraulic dredge would eliminate turbidity and allow control of spoil so as to prevent any damages from those causes.

(n) The construction of a navigable connection between Bayou Lafourche and Barataria Pass would not be detrimental to wildlife or fishery resources of the area, but would be of immense benefit to those engaged in these occupations.

67. Briefs of the U.S. Fish and Wildlife Service are included herein as appendix F and appendix G. Brief of the Louisiana Wildlife and Fisheries Commission is included as appendix H.

PLAN OF IMPROVEMENT

68. In order to accommodate present and prospective commerce the proposed plan of improvements relating to Bayou Lafourche is as follows:

(a) Provide about 28 miles of new auxiliary 12- by 125-foot channel west of and generally paralleling Bayou Lafourche, extending from the Intracoastal Waterway at mile 37.2 west of Harvey Lock in a southerly direction and entering Bayou Lafourche at Leeville (mile 12.0). This route utilizes a natural waterway known as Grand Bayou Blue and Grand Bayou Canal where possible and land cuts elsewhere.

(b) Provide a 12- by 125-foot stub channel from Golden Meadow to the new auxiliary channel, a length of approximately 3.25 miles.

(c) Provide a channel of 12- by 125-feet in Bayou Lafourche from Leeville to the 12-foot depth contour in the Gulf of Mexico via Belle Pass.

(d) Provide a channel of 9 by 100 feet in Bayou Lafourche from Leeville to the vicinity of the lower limits of Golden Meadow.

(e) Restore and extend the existing jetties at Belle Pass to the 12-foot depth contour in the Gulf of Mexico, if and when such extension is found advisable to reduce maintenance dredging in the Gulf of Mexico.

69. The proposed improvements will adequately serve the fishing fleet and barge tows. No alteration of existing bridges will be required. However, it will be necessary to provide a pontoon bridge at the point where the proposed 12- by 125-foot canal crosses the Bourg-Larose highway (Louisiana State Highway No. 24). This is a secondary highway and such a bridge will be adequate for both navigation and highway traffic. No other plans of improvement of Bayou Lafourche are submitted, as the only alternative (the widening of Bayou Lafourche) is economically prohibitive. Improvement of Bayou Lafourche from Lockport to Tallieu (north of Thibodaux) in order to care for existing movement of traffic on that reach was studied but found to be not justified. Prospective traffic for Bayou Lafourche above Tallieu is not apparent. Rights-of-way for the channel and the spoil disposal areas for the recommended improvements will be located in low or marsh lands.

70. The Lafourche-Jump Waterway would extend from a point on the east bank of Bayou Lafourche above the highway bridge at Leeville, following the Southwest Louisiana Canal for 3.8 miles, turning southeastward through the marshlands to Bay St. Honore and then through Bayou Rigaud, passing along the north shore of Grande Isle. (The easterly 3.2 miles of Bayou Rigaud has been recommended for improvement to a 12- by 125-foot channel as part of the Barataria Bay Waterway, La.) After leaving Grand Isle the route is northeastward through Barataria Bay, Bay Melville, Bay Ronquille, and a marsh cut to the Lake Washington Oil Field. From Lake Washington the route continues eastward for about 5 miles mostly through marshland with the exception of necessary crossings of small lagoons and bayous. The route then turns southeastward passing north of Bastian Bay and crosses the Empire-Gulf Waterway at mile 37.35 east of Bayou Lafourche. After crossing the Empire-Gulf Waterway the route continues southeasterly to the north of Bay Coquette, where it turns eastward to connect with the Jump

and the Mississippi River. The total length of the waterway is about 61 miles.

71. The depth of 12 feet and bottom width of 125 feet was considered necessary to commercial navigation on the auxiliary waterway between the Intracoastal Waterway and Leeville and on the proposed waterway east of Leeville because of the following reasons:

(a) Water surfaces during winter months are depressed considerably by strong northerly winds.

(b) These channel dimensions will allow the use of modern, economical towing equipment.

(c) Movement of crude oil from the area will be in barges of 8.5-foot draft.

(d) The amount of traffic over these reaches composed of drilling barges, dredges, and other vessels drawing 7 to 9 feet of water require a depth of 12 feet and a bottom width of 125 feet for proper operation and ease of passing.

72. The economic feasibility of providing a larger channel on Bayou Lafourche south of Leeville is based on the same reasons as those which require a 12 by 125-foot channel on the auxiliary channel and on the channel east of Bayou Lafourche.

73. Other plans were studied for a route extending from Bayou Lafourche eastward and terminating at an existing waterway connection to the Freeport Sulphur Co.'s mine at Grand Ecaillie, and from Bayou Lafourche eastward to Rattlesnake Bayou on the east side of Barataria Bay and thence through Grand Bayou and across Bay Adams to the Empire Lock at the Mississippi River. Both plans were found to lack economic justification because of the small segment of commerce which they would benefit and were given no further consideration.

74. The benefits accruing to the connection between Bayou Lafourche at Leeville and the Barataria Bay Waterway (recommended for improvement to 12 by 125 feet) were also studied in lieu of the proposed auxiliary channel to the west of Bayou Lafourche.

SHORELINE CHANGES

75. The improvements considered herein will not result in any appreciable change of the shoreline.

AIDS TO NAVIGATION

76. The U.S. Coast Guard, Eighth Coast Guard District, has been consulted as to aids to navigation. Costs of additional navigation aids required are shown in "Estimates of first cost and annual charges." A copy of letter dated May 10, 1951, from the commander, Eighth Coast Guard District, is contained in appendix D. On June 1, 1954, the commander advised the reporting officer by telephone that a review of his estimates on that date substantiated his original figures.

ESTIMATES OF FIRST COST

77. The first costs of the proposed work, based on December 1956 prices, are shown below:

First cost

BAYOU LAFOURCHE, AUXILIARY CHANNEL

Initial investment	Federal	Non-Federal	Total
Dredging.....	\$2,034,000	\$329,000	\$2,363,000
Rights-of-way and spoil areas.....		182,000	182,000
Pontoon bridge.....		158,000	158,000
Lowering pipelines and submarine cables.....		310,000	310,000
Total ¹	2,034,000	979,000	3,013,000

BAYOU LAFOURCHE FROM LEEVILLE TO THE GULF OF MEXICO

Dredging.....	\$589,000	-----	\$589,000
Extension of jetties ²	462,000	-----	462,000
Navigation aids.....	15,000	-----	15,000
Rights-of-way and spoil areas.....		\$11,000	11,000
Lowering pipelines and submarine cables.....		158,000	158,000
Total ¹	1,066,000	169,000	1,235,000

BAYOU LAFOURCHE FROM LEEVILLE TO THE VICINITY OF THE LOWER LIMITS OF GOLDEN MEADOW, LA.

Dredging.....	\$210,000	-----	\$210,000
Lowering pipelines and submarine cables.....		\$114,000	114,000
Rights-of-way for spoil disposal.....		8,000	8,000
Total ¹	210,000	122,000	332,000

LAFOURCHE-JUMP WATERWAY

Dredging.....	\$5,227,000	-----	\$5,227,000
Aids to navigation.....	6,000	-----	6,000
Rights-of-way and spoil disposal areas.....		\$281,000	281,000
Total ¹	5,233,000	281,000	5,514,000

LAFOURCHE-JUMP WATERWAY

(Bayou Lafourche to Barataria Pass only)

Dredging.....	\$1,369,000	-----	\$1,369,000
Rights-of-way and spoil disposal areas.....		\$73,000	73,000
Navigation aids.....	3,000	-----	3,000
Total ¹	1,372,000	73,000	1,445,000

¹ Includes engineering, inspection, overhead, and contingencies.² Deferred construction.

ESTIMATES OF ANNUAL CHARGES

78. The annual charges of the proposed improvements are shown below:

Annual charges

BAYOU LAFOURCHE, AUXILIARY CHANNEL

Initial investment	Federal	Non-Federal	Total
Interest.....	\$51,000	\$24,000	\$75,000
Amortization.....	21,000	10,000	31,000
Maintenance:			
Dredging.....	28,000	4,000	32,000
Pontoon bridge.....		26,000	26,000
Total.....	100,000	64,000	164,000

BAYOU LAFOURCHE FROM LEEVILLE TO THE GULF OF MEXICO

Interest.....	\$27,000	\$4,000	\$31,000
Amortization.....	11,000	2,000	13,000
Maintenance:			
Dredging.....	10,000		10,000
Jetties.....	8,000		8,000
Navigation aids.....	700		700
Total.....	56,700	6,000	62,700

BAYOU LAFOURCHE FROM LEEVILLE TO THE LOWER LIMITS OF GOLDEN MEADOW

Interest.....	\$5,000	\$3,000	\$8,000
Amortization.....	2,000	1,300	3,300
Maintenance dredging.....	5,000		5,000
Total.....	12,000	4,300	16,300

LAFOURCHE-JUMP WATERWAY

Interest.....	\$131,000	\$7,000	\$138,000
Amortization.....	54,000	3,000	57,000
Maintenance:			
Dredging.....	61,100		61,100
Navigation aids.....	1,000		1,000
Total.....	247,100	10,000	257,100

LAFOURCHE-JUMP WATERWAY

(Bayou Lafourche to Barataria Pass only)

Interest.....	\$34,000	\$2,000	\$36,000
Amortization.....	14,000	1,000	15,000
Maintenance:			
Dredging.....	17,600		17,600
Navigation aids.....	400		400
Total.....	66,000	3,000	69,000

ESTIMATES OF BENEFITS

(a) Bayou Lafourche from Leeville to the gulf and auxiliary channel

79. General.—Current navigation benefits attributable to the plan of improvement contemplated on these waterways are derived from the movement of crude oil from, and of material and equipment to, producing fields in the area; the movement of shell, shrimp, and oysters by fishing vessels; elimination of damages to vessels and wharves; and from provision of a needed harbor of refuge from gulf storms.

80. Expansion of the shrimping industry since 1938, when large shrimp were found in the deeper waters of the Gulf of Mexico, has increased the number and size of fishing vessels operating on Bayou Lafourche. Expansion of both oil and fishing operations has exceeded the physical abilities of the bayou to accommodate adequately the water traffic. Narrow channel widths, further reduced by buildings and moored vessels, make travel over the bayou excessively slow for heavy tows with the additional hazard of possible collisions and resulting damage to moored craft and buildings. Navigation is restricted within the narrow channel width along the thalweg.

81. *Crude oil.*—The life of an oilfield is very difficult to estimate. However, with the present conservation program, the life of producing strata has been increased. Discovery of new producing sands in both Leeville and Golden Meadow fields has been adding to the production and also extending the probable life of the fields. The limits of the Bay Marchand field have not been determined and it is expected that 10 years will be necessary just to develop the extent of the field. The same is true of the Bully Camp and Timbalier Bay fields, as the limits of these two fields have not yet been determined. In fact, the company controlling the Timbalier Bay field and the major part of the Bully Camp field recently has taken a 50-year lease on the site of their district office which handles these fields; and the lease contains a renewal clause for another 50 years. The Lake Racourci field has not been fully developed as to its extent. The probable life of the existing fields would approach 50 years, equivalent to the economic life of the proposed project. The area surrounding Bayou Lafourche is extremely promising as to the potential production of oil. The gulf area around the Bay Marchand field is entirely leased by oil operators, but development has been slow because of the tidelands situation. Bay Marchand field was being developed prior to the start of the tidelands controversy. A new field has been discovered to the west of Bully Camp but the extent and character is not fully determined because sufficient drilling has not yet taken place. Benefits from oil operations are expected to continue over the life of the project at a rate equal to or greater than those claimed.

82. Crude oil produced in the Timbalier Bay and Bay Marchand fields is being transported by pipeline to Ostrica, La., on the Mississippi River, at which point it is carried by tanker to refineries in Texas. During times of emergency when tankers are scarce or the use of the Gulf of Mexico is denied or made hazardous because of enemy action, the Lafourche auxiliary channel will afford an excellent route to the Intracoastal Waterway for the movement of crude oil to the west or east.

83. The movement of crude oil by barge is occurring from only the Golden Meadow Field. Some crude oil from this field is moved to Lake Charles, La.

84. Study of this commerce reveals that 365,000 barrels of crude oil are moved annually, 1,000 barrels daily from Golden Meadow. The proposed improvement will allow increased loading of barges and handling an additional barge, and a savings of 2.3 cents a barrel will be possible on the oil from Golden Meadow. The annual saving on the movement of crude oil will be \$8,400.

85. Before advantage of the bypass route can be realized at the Golden Meadow Field, it will be necessary for private interests to

construct an oil loading facility on the stub canal to be built by local interests. The facility will cost an estimated \$75,000 with an annual cost of \$4,800.

86. The net savings on oil now moving will be as follows:

Gross savings.....	\$8,400
Less annual cost of facility.....	4,800
Net savings.....	3,600

87. New oil discoveries in the area will place additional crude oil tonnage on the improved waterway. In addition to the new discoveries it is expected that some of the crude oil now moving by pipeline which is free to move by other means will seek other markets which the improvement will make economically possible and which are not reached by pipeline. A potential increase of 500,000 barrels of crude oil annually can be reasonably expected. At a savings of 2.3 cents a barrel this will result in an additional \$11,500 savings annually. The total present and potential savings from crude oil movements will be \$15,100. The details on the computation of benefits are contained in appendix B.

88. *Materials and equipment.*—The exploration and production of oil in the offshore area of the Gulf of Mexico is becoming a major phase in oil operations. One producing field, the Bay Marchand field, lies in this area near the mouth of Bayou Lafourche. Because the improved route can be navigated at higher speed, with the same tugboat, a savings of \$25,000 can be realized on the movement of materials to this field. These benefits are divided between the auxiliary channel (68 percent) and the improvement of Bayou Lafourche below Leeville (32 percent).

89. Future operations in the gulf area in this vicinity are assured and it is expected that the savings to future offshore operations will increase considerably in the next few years.

90. Inland producing oilfields along the proposed improvements are listed below:

- Leeville Field
- Lake Racourci Field
- Timbalier Bay Field
- Golden Meadow Field
- Bully Camp Field
- Bayou Jean LaCroix Field

The improved waterway will facilitate the movement of drilling barges, dredges, materials and supplies to these fields by affording a route which will eliminate many hours from the time now required to

move these items to the existing fields. The annual savings for each field are shown below:

Present savings

Leeville Field:

Savings on supplies	\$6,000
Savings on drilling barges	6,800
Savings on dredges	1,900
Total	14,700

Lake Racourci Field:¹

Savings on supplies	6,500
Savings on drilling barges	5,300
Savings on dredges	4,200
Total	16,000

Timbalier Bay Field:¹

Savings on supplies	5,600
Savings on drilling barges	5,300
Savings on dredges	4,200
Total	15,100

Golden Meadow Field:

Savings on supplies	49,200
Savings on dredges	12,300
Savings on drilling barges	19,500
Total	81,000

Bully Camp Field:

Savings on supplies	13,800
Savings on dredges	9,100
Savings on drilling barges	4,800
Total	27,700

Bayou Jean LaCroix Field:

Savings on supplies	6,200
Savings on drilling barges	3,700
Savings on dredges	3,300
Total	13,200

Total savings **167,700**

¹ The benefits are divided between the auxiliary channel (80 percent) and the improvement of Bayou Lafourche south of Leeville (20 percent).

Detailed computation of these benefits is shown in Appendix B.

91. A sulfur deposit exists in the Bully Camp area and it has been stated that with water facilities for the transportation of the mined product the deposit would be worked. Annual savings on the movement of sulfur and supplies are estimated at \$124,200. While benefits on the movement have been estimated they are not claimed at this time. Computation of benefits is shown in appendix B.

92. The elimination of the auxiliary channel through Grand Bayou Blue and the substitution therefor of only the connection to the recommended Barataria Bay Waterway would not produce the same benefits because of the origin of the supplies for the various fields along Bayou Lafourche, and the distances to the fields from Harvey, La. The bulk of the materials for Golden Meadow and Leeville Fields originates from Houma, La. Materials for offshore drilling

originate at Harvey, Houma, and Morgan City. Materials used in the Bully Camp, Jean LaCroix, Lake Raccourci, and Timbalier Bay Fields are hauled from Harvey and Houma. The economic advantage of supplying these fields from Houma is resulting in a rapid shifting to that point as a supply center.

93. Comparison of the benefits accruing to the auxiliary channel with those accruing to the connection from the Barataria Bay Waterway alone indicates that the auxiliary channel will afford benefits far in excess of those to be realized by the other connection. This is true because the tonnage originating west of Bayou Lafourche cannot advantageously use the Barataria Bay Waterway to reach the oil fields. Benefits on the movement of drilling barges and dredges are much greater over the auxiliary route. Drilling barges and dredges are moved mostly to areas west of Bayou Lafourche. The auxiliary channel provides greater benefits on the movement of this equipment as it provides an improved transportation route through the area involved. The auxiliary channel will likewise result in the movement of sulfur which is not now moving.

94. The following are the estimated benefits on these movements which the Barataria Waterway connection will provide:

Movement of drilling barges and dredges	\$22,250
Materials from Harvey	3,500
Total benefits	25,750

95. Benefits for the movement of the same equipment and materials over the auxiliary channel are much greater. The auxiliary channel will provide additional benefits on the movements of materials and equipment from west of Bayou Lafourche and on crude oil.

96. The rate of drilling for the various fields from which tonnages of materials and supplies for drilling were derived resulted in a total tonnage of 221,000 tons. Records of the tonnages of materials (cement, steel, machinery, piling, lumber, wood, drilling mud, and miscellaneous) used for drilling oil wells show that this tonnage was about 280,000 tons in 1955. Indications are that this tonnage will continue to increase substantially for a number of years. However, the tonnage on which benefits were computed is 59,000 tons less than that carried by water in 1955. This is a decrease in the present rate of drilling of about 19 wells annually. The rate of drilling assumed does not consider workovers of oil wells which are required for various reasons and which become more frequent with the aging of the fields.

97. For these reasons it is believed that the estimates of benefits derived from the movement of oil field equipment and supplies are conservative.

98. *Shrimp.*—Bayou Lafourche is the home for 382 shrimping vessels and supports a sizable shrimp industry. The present trend in shrimping vessels is toward larger boats that can withstand the rigors of offshore shrimping in the Gulf of Mexico. The present 6-by 60-foot project on Bayou Lafourche does not afford sufficient depth in the bayou or at its mouth to allow the efficient use of Bayou Lafourche. The shrimp vessels are therefore forced at times to use circuitous routes to reach the fishing grounds in the Gulf of Mexico. At the present time there is a privately marked and maintained channel from Bayou Lafourche to Barataria Pass, through which pass a 12-foot channel is maintained by an oil company. Through the use of

these channels the shrimping vessels can reach the Gulf of Mexico with only a small increase in mileage. It is estimated that the benefits which the proposed improvement of Bayou Lafourche from Leeville to the 12-foot contour in the gulf would bring to the shrimping industry is \$25,400.

99. In the event that private interests fail to mark and maintain the channel now used much longer routes will have to be used. The amount of these benefits are estimated to equal the annual cost for marking and maintaining the channel which is about \$77,000. The total savings to shrimp vessels will be about \$102,400. Details on the computation of these benefits are contained in appendix B.

100. Navigational hazards in Bayou Lafourche between Golden Meadow and Larose are moored vessels, buildings which extend into the bayou, and because of the narrow width, other tows. Records of the amount of damage incurred are not available; however, in the best judgment of the reporting officer a savings of \$10,000 would be realized annually by the elimination of damages incurred, which would be achieved by the proposed project.

101. Deepening of Belle Pass will increase the efficiency of Bayou Lafourche as a harbor of refuge from bad weather on the Gulf of Mexico. Experience with storms indicates that at least one precautionary or evacuation order will be issued to drilling activities during each hurricane season. While a firm monetary evaluation of the project as a harbor of refuge is impossible, in the best judgment of the reporting officer they would approximate \$3,500 annually.

102. The total benefits to be expected from the proposed improvement of Bayou Lafourche from Leeville to the Gulf of Mexico and from the auxiliary channel are as follows:

	Benefits to auxiliary channel	Benefits to Bayou Lafourche below Leeville
Movement of crude oil	\$15,100	
Movement of supplies and equipment	178,700	\$14,300
Movement of shrimping vessels		102,400
Elimination of damages	10,000	
Harbor of refuge		3,500
Total	203,800	120,200

b. Bayou Lafourche from Leeville to Golden Meadow

103. The improvement of Bayou Lafourche from Leeville to the vicinity of the southern limits of Golden Meadow is desirable for the efficient operation of the larger shrimping vessels which utilize the bayou. It is estimated that the improvement of Bayou Lafourche north of Leeville to Golden Meadow will result in benefits to the fishing fleet which will amount to \$20,100 annually. These benefits will accrue because of increased speed and elimination of damages to underwater parts of the vessels.

104. The 6- by 60-foot project north of Golden Meadow is not adequate for the proper operation of the larger shrimping vessels. However, the lack of a larger channel between Golden Meadow and Larose will not be the handicap that it would be along an undeveloped reach of the bayou. Shrimping vessel traffic decreases with the distance upstream from Golden Meadow, so that the farther upstream

the less the traffic. The banks of Bayou Lafourche are lined by buildings and wharves to which are moored numerous small boats and skiffs. The proper and safe operation of a vessel through this reach of Bayou Lafourche requires a reduction in speed in order to keep wave wash to reasonable limits to prevent damage to moored vessels and structures. This reduction in speed reduces vessel squat considerably so that the handicap of the 6-foot channel is greatly minimized. With improved entrances to the Gulf of Mexico south of Golden Meadow fishing vessel traffic on Bayou Lafourche between Golden Meadow and Larose will be further reduced, as vessels will not be forced to use circuitous routes by way of the Intracoastal Waterway.

105. Large quantities of oysters are produced in the shallow bays to the east and west of Bayou Lafourche, such as Lake Raccourci, Little Lake, Timbalier Bay, and others. Vessels for the oyster industry are designed with shallow water operation in mind, and while they are long and beamy, and displace a considerable quantity of water when loaded, their drafts will not exceed 5 feet in most instances. Consequently, the improvement of Bayou Lafourche will not benefit the oyster industry to any appreciable degree.

c. *Lafourche-Jump Waterway*

106. The Lafourche-Jump Waterway would provide a navigable waterway connection from the Mississippi River at the Jump (Venice, La.) to Bayou Lafourche at Leeville, La., and through the proposed auxiliary Bayou Lafourche channel with the Intracoastal Waterway. The Lafourche-Jump route would intersect the waterway from Empire to the Gulf of Mexico, a 9- by 80-foot Federal project; the Barataria Bay Waterway, a 5- by 50-foot Federal project (which has been recommended for enlargement to a 12- by 125-foot project); and with the proposed Bayou Lafourche improvement. This lateral waterway along the coast would facilitate the movement of crude oil from the Mississippi River Delta area to New Orleans; would facilitate the movement of supplies and equipment from the supply center along Harvey Canal to the many oil fields in the area traversed, would also aid the movement of shrimp and oyster vessels, and the movement of sulfur from the west of Bayou Lafourche to Port Sulphur. The introduction of fresh water from the Mississippi River into the area at the eastern end of the Lafourche-Jump Waterway would probably result in some damage to oysters in this locality, and would disturb the present fresh-salt water balance, which would be reestablished in some other area. The damage to oysters in the area involved would not be widespread. As the amount of damages have not been estimated by the Louisiana Wild Life and Fisheries Commission; the U.S. Department of Interior, Fish and Wildlife Service; or the Louisiana Oyster Dealers and Growers Association, Inc., no monetary evaluation of the damages to oysters was attempted.

107. Some of the traffic over the Lafourche-Jump Waterway would be dependent upon the construction of the Bayou Lafourche auxiliary channel, and a portion of the benefits arising from the Lafourche-Jump Waterway would accrue to that waterway. Details on the computation of benefits for the Lafourche-Jump Waterway and their division are contained in appendix C.

108. The benefits accruing to the Lafourche-Jump Waterway are shown below:

	Present savings	Potential savings	Total savings
Movement of crude oil.....	\$105,000	\$52,000	\$157,000
Movement of supplies.....	102,000	-----	102,000
Movement of drilling barges.....	91,000	-----	91,000
Movement of supplies for sulphur.....	4,300	-----	4,300
Movement of sulfur from Bay St. Elaine.....	10,200	-----	10,200
Movement of sulfur from Lake Peltot.....	-----	29,200	29,200
Movement of shrimp vessels.....	212,800	-----	212,800
Movement of oysters.....	19,200	-----	19,200
Total benefits.....	544,500	81,200	625,700

109. Alternate plans were studied for east-west routes extending from Bayou Lafourche eastward and terminating at an existing adequate waterway connection to the Freeport Sulphur Co.'s mine at Grand Ecaillie, and from Bayou Lafourche eastward to Rattlesnake Bayou on the east side of Barataria Bay and thence through Grand Bayou and across Bay Adams to the Empire lock at the Mississippi River. Both plans were found to lack economic justification and were given no further consideration.

d. *Lafourche-Jump Waterway (Bayou Lafourche to Barataria Pass only)*

110. The possibility of providing a connection between Bayou Lafourche and Barataria Pass was investigated and found to have economic justification. While this connection would not provide the benefits of the connection between Bayou Lafourche and the Mississippi River at the Jump, it nevertheless would result in benefits to the oil, sulphur, and shrimping industries in that it would provide a route more readily navigated, and for the shrimping vessels a shorter route between Bayou Lafourche and gulf waters around the mouth of the Mississippi River in which considerable shrimping takes place annually. The benefits of the connection between Bayou Lafourche and Barataria Pass are shown below:

	Present savings	Potential savings	Total savings
Movement of drilling barges.....	\$3,700	-----	\$3,700
Movement of sulfur.....	10,200	\$29,200	39,400
Movement of shrimping vessels.....	57,600	-----	57,600
Total.....	71,500	29,200	100,700

Details on the computation of these benefits will be found in appendix C.

COMPARISON OF BENEFITS AND COSTS

111. The ratio of benefits to costs are as follows:

Route	Annual charges	Benefits	Benefit-to-cost ratio
Bayou Lafourche auxiliary channel	\$164,000	\$203,800	1.2
Bayou Lafourche from Leeville to the Gulf of Mexico	62,700	120,200	1.9
Bayou Lafourche from Leeville to the lower limits of Golden Meadow	16,300	20,100	1.2
Lafourche-Jump Waterway	257,100	625,700	2.4
Lafourche-Jump Waterway (Bayou Lafourche to Barataria Pass only)	69,000	100,700	1.5

PROPOSED LOCAL COOPERATION

112. The following local cooperation is proposed for the Bayou Lafourche auxiliary channel and Bayou Lafourche:

(a) Provide without cost to the United States all lands, easements, and rights-of-way necessary for the construction of the project and for subsequent maintenance when and as required.

(b) Construct and maintain without cost to the United States all alterations to pipelines, cables, and any other facilities necessary for the construction of the project.

(c) Dredge and maintain a 12- by 125-foot connection from Golden Meadow to the 12- by 125-foot auxiliary route.

(d) Construct, maintain, and operate a pontoon bridge at Larose.

(e) Hold and save the United States free from damages due to the proposed construction and future maintenance.

Responsible State and parish organizations have agreed to comply fully with requirements of local cooperation for the proposed improvement of Bayou Lafourche and the auxiliary channel.

113. Proposed local cooperation for the Lafourche-Jump Waterway is as follows:

(a) Provide without cost to the United States all lands, easements, and rights-of-way necessary for the construction of the project and for subsequent maintenance when and as required.

(b) Construct and maintain without cost to the United States all alterations to pipelines, cables, and any other facilities necessary for the construction of the project.

(c) Hold and save the United States free from damages due to the proposed construction and future maintenance.

The police jury of Jefferson Parish has indicated its willingness to comply with the requirements for local cooperation for the Lafourche-Jump Waterway. The police jury of Plaquemines Parish has, however, refused to provide the required local cooperation for the Lafourche-Jump Waterway. Copies of the resolution of the two parish police juries are included as appendixes I and J.

114. Proposed local cooperation for the connection between Bayou Lafourche and Barataria Pass is the same as that for the Lafourche-Jump Waterway. The police jury of Jefferson Parish and the police jury of Lafourche Parish have indicated their willingness to comply with the requirements for local cooperation for the proposed connection between Bayou Lafourche and Barataria Pass. These are included in appendixes J and M.

ALLOCATION OF COSTS

115. Allocation between Federal and non-Federal agencies is set forth in paragraphs under "Estimates of first cost" and "Estimates of annual charges."

COORDINATION WITH OTHER AGENCIES

116. The extent of consultation with State and Federal agencies and local organizations is indicated under "Scope of survey." The views of the U.S. Department of the Interior, Fish and Wildlife Service, are contained in appendixes F and G. The views of the Louisiana Department of Wild Life and Fisheries are contained in appendix H. The Louisiana Department of Public Works and the police jury of Lafourche Parish are in favor of the project for the improvement of Bayou Lafourche, including the reach between Leeville and Golden Meadow, and the Bayou Lafourche auxiliary route. The Louisiana Department of Public Works and the police juries of Lafourche and Jefferson Parishes are in favor of the Lafourche-Jump Waterway. However, as stated in paragraph entitled "Proposed local cooperation", the police jury of Plaquemines Parish is not willing to meet the requirements for local cooperation.

DISCUSSION

117. Bayou Lafourche serves as the water link between the producing oilfields along its course and the refineries and supply centers; as well as for the seafood companies along its banks and the fishing areas. Recent development of the oilfields lying along and near the lower reaches of Bayou Lafourche has resulted in a considerable increase in the number of large tows using the bayou.

118. The discovery of the offshore shrimping resources in 1938 brought about the use of larger shrimping vessels which can safely fish and navigate the open waters of the Gulf of Mexico. This discovery, together with the development of the quick freezing of shrimp, soon transformed the local shrimp market to one of nationwide extent, and resulted in an expansion of shrimp facilities including both vessels and factories.

119. Increase of the oil traffic on Bayou Lafourche together with the increase in local shrimping vessels soon created a navigation problem. Movement of the large oil barges and drilling equipment over the bayou is exceedingly difficult because of the many boats moored along the banks and also because of the structures along the banks which extend beyond the mean low-water line of the bayou. The tows traversing the bayou must proceed very slowly in an effort to avoid moored craft and the buildings along the waterway. On windy days an extra tug is employed in an effort to hold the tow straight and avoid striking buildings or vessels. In spite of the utmost precaution which is exercised by towing operators, accidents occur and heated arguments ensue before damages are settled. Bloodshed has not yet occurred from any of these accidents although it is reported that threats of bodily harm have been made.

120. The present Federal project on Bayou Lafourche provides for a 6- by 60-foot channel from Napoleonville to Lockport, and a channel of the same dimensions from Larose to the 6-foot depth contour in

the Gulf of Mexico via Belle Pass. Between Lockport and Larose the channel was formerly a section of the 9- by 100-foot Intracoastal Waterway. Modification of the project on Bayou Lafourche to sufficient dimensions (12 by 125 feet) to accommodate the heavy tows is impracticable in the reach from Larose through Golden Meadow, because of the highways on both banks and the numerous wharves and buildings extending into and along the bayou in this reach. Increasing the project to 12 by 125 feet would entail the movement of practically every building and the highways along both banks, as the physical width of the bayou is insufficient to accommodate such a project.

121. With the exception of Belle Pass, centerline depths in Bayou Lafourche exceed the authorized project depth of 6 feet, but such excess depths do not prevail over an appreciable bottom width. Tows must be limited to shallow drafts and great difficulty is experienced in passing other tows. Large fishing vessels often run aground when leaving the center of the bayou to pass large tows.

122. As Bayou Lafourche cannot be improved to dimensions which will adequately accommodate both the oil and the fishing interests it is proposed to dredge a 12- by 125-foot auxiliary channel from the Intracoastal Waterway at mile 37.2 west of Harvey lock to follow a southerly course, utilizing Grand Bayou Canal and Grand Bayou Blue as much as possible, entering Bayou Lafourche below the highway bridge at Leeville.

123. To provide adequate depth and width in Bayou Lafourche below Leeville it is proposed to increase the project to 12 by 125 feet from the point where the auxiliary channel connects with Bayou Lafourche to the same depth in the Gulf of Mexico; and to extend the jetties to that same depth, if and when such extension is found advisable to reduce maintenance dredging in the Gulf of Mexico. This improvement will allow passage into and out of the gulf at Belle Pass under all weather conditions not only for fishing vessels but also for most of those engaged in offshore oil development.

124. The total first cost of the auxiliary channel is \$3,013,000 and total annual carrying charges are \$164,000. Benefits are estimated at \$203,800 and the benefit-to-cost ratio is 1.2. The total first cost of the improvement of Bayou Lafourche from Leesville to the Gulf of Mexico is \$1,235,000, and total annual carrying charges are \$62,700. Benefits are estimated at \$120,200 and the benefit-cost ratio is 1.9.

125. The total first cost of the proposed improvement of Bayou Lafourche from Leeville to Golden Meadow is estimated at \$332,000 and annual charges are \$16,300. Benefits are estimated at \$20,100 annually and the benefit-to-cost ratio is 1.2.

126. The proposed improvements will meet the requests of local interests as expressed at the public hearing held at Golden Meadow, La., on January 7, 1953. Improvement of Bayou Lafourche north of Lockport is not considered economically justified because of the small segment of tonnage which it would serve.

127. Bayou Lafourche presents no problem involving flood control. The malarial control, prevention of stream pollution, and beneficial uses of water along Bayou Lafourche have been taken care of by State interests and the Lafourche Parish Fresh Water District by the installation of pumps at the head of Bayou Lafourche at Donaldsonville to provide 400 cubic feet per second of Mississippi River water into the bayou.

128. The Lafourche-Jump Waterway would afford a much needed east-west route between Bayou Lafourche and the Mississippi River and would traverse a marshy area rich in petroleum, sulfur, and seafoods. Water access to the area is provided by waterways extending north and south, so that travel from Bayou Lafourche to the Mississippi River is very circuitous. Provisions of a navigable waterway from Bayou Lafourche to the Mississippi River would intersect the north-south feeders and facilitate the movement of all types of commerce in the area.

129. The Lafourche-Jump Waterway would fulfill the requests of local interests as expressed at the public hearing at Golden Meadow, La., on January 7, 1953. However, the police jury of Plaquemines Parish has stated that it will not furnish the necessary rights-of-way for the project, and the Louisiana Oyster Dealers & Growers Association, Inc., has expressed objection to the project on the ground that it would do great damage to oysterbeds in the immediate area. It is believed that some localized damage to oysters would occur at the extreme eastern end of the Lafourche-Jump Waterway, as the present balance between fresh and salt water would be disturbed. This water balance would be reestablished in some other area and would be conducive to the forming of oyster grounds which are not very productive at this time. It is not believed that damages would be sustained over a widespread area, and it is doubtful if any appreciable acreage of existing oysterbeds would be completely obliterated.

130. The total first cost of the Lafourche-Jump Waterway is \$5,514,000 and total annual carrying charges are \$257,100. Benefits are estimated at \$625,700 annually and the benefit-to-cost ratio is 2.4.

131. In order to partly fulfill the need for a navigable channel through the marsh area lying to the east of Bayou Lafourche, alternate plans were studied for east-west routes extending from Bayou Lafourche eastward. A navigable connection between Bayou Lafourche and Barataria Pass proved to have economic justification.

132. The total first cost of the construction between Bayou Lafourche and Barataria Pass is \$1,445,000 and total annual carrying charges are \$69,000. Benefits are estimated at \$100,700 annually and the benefit-to-cost ratio is 1.5.

CONCLUSION

133. The plan of improvement found most suitable for the relief of navigation difficulties on Bayou Lafourche is:

(a) Dredge an auxiliary 12- by 125-foot channel leaving the Intracoastal Waterway at mile 37.2 west of Harvey Lock along a southerly course, and entering Bayou Lafourche below the highway bridge at Leeville, with a stub canal at Golden Meadow.

(b) Dredge Bayou Lafourche from Leeville (junction with the proposed auxiliary channel) to provide a 12- by 125-foot channel to the 12-foot depth contour in the Gulf of Mexico by way of Belle Pass.

(c) Modify and extend the existing jetties at Belle Pass to the 12-foot depth contour.

(d) Provide a channel of 9 by 100 feet in Bayou Lafourche from Leeville to the vicinity of the lower limits of Golden Meadow.

134. Funds representing the Federal first cost (\$2,833,000) should be provided for the completion of the dredging and construction of

navigation aids in one working season. Extension of the jetties are to be deferred until such extension is warranted to reduce maintenance dredging in the Gulf of Mexico.

135. The plan of improvement for the Lafourche-Jump Waterway is to dredge a 12- by 125-foot channel from Bayou Lafourche at Leeville through the Southwest Louisiana Canal and along the route shown on map, file H-2-18041/1 to the Mississippi River at Venice. The Lafourche-Jump Waterway is not considered for construction because of the unwillingness of local interests to meet the required conditions of local cooperation and because of the objection by the Louisiana Oyster Dealers & Growers Association, Inc., supported by the Louisiana Wild Life and Fisheries Commission.

136. The plan of improvement for the connection between Bayou Lafourche and Barataria Pass is to dredge a 12- by 125-foot channel from the point of junction of Bayou Lafourche and the auxiliary channel (just below Leeville) through the Southwest Louisiana Canal and along the route shown on map, file H-2-18041/1 to connect with Barataria Pass.

RECOMMENDATION

137. It is recommended that the project for "Bayou Lafourche, La.," be modified to provide—

(a) A 12- by 125-foot channel, extending from the Intracoastal Waterway at mile 37.2 west of Harvey Lock to enter Bayou Lafourche below the highway bridge at Leeville at about mile 12;

(b) A 12- by 125-foot channel in Bayou Lafourche from the point of junction with the proposed 12- by 125-foot channel to the 12-foot depth contour in the Gulf of Mexico;

(c) Modification and extension of the existing jetties from the 6-foot contour to the 12-foot contour, if and when such extension is found advisable to reduce maintenance dredging in the Gulf of Mexico;

(d) A channel of 9 by 100 feet in Bayou Lafourche from Leeville to the vicinity of the lower limits of Golden Meadow;

at an estimated Federal first cost of \$2,833,000 for dredging and \$462,000 for extension of the jetties and an annual Federal maintenance cost of \$51,000, exclusive of the estimated costs of \$15,000 and \$700 for construction and annual maintenance, respectively, of navigation aids, subject to the condition that local interests—

(e) Provide without cost to the United States all lands, easements, and rights-of-way necessary for the construction of the project and for subsequent maintenance when and as required;

(f) Construct and maintain without cost to the United States all alterations to pipelines, cables, and any other facilities necessary for the construction of the project;

(g) Dredge and maintain a 12- by 125-foot connection from Golden Meadow to the 12- by 125-foot auxiliary channel;

(h) Construct, maintain, and operate a pontoon bridge across the auxiliary channel where required;

(i) Hold and save the United States free from damages due to the proposed construction and future maintenance.

138. It is further recommended that the project for Bayou Lafourche be modified to provide a 12- by 125-foot channel from Bayou Lafourche at Leeville from the point where the auxiliary channel con-

nects with Bayou Lafourche through the Southwest Louisiana Canal to and through Bayou Rigaud to connect with the enlargement of Bayou Rigaud recommended under the project "Barataria Bay Waterway, La.," at an estimated Federal first cost of \$1,369,000 and an annual maintenance cost of \$17,500, exclusive of the estimated costs of \$3,000 and \$400 for construction and annual maintenance, respectively, of navigation aids, subject to the condition that local interests—

- (a) Provide without cost to the United States all lands, easements, and rights-of-way necessary for the construction of the project and for subsequent maintenance when and as required;
- (b) Construct and maintain without cost to the United States all alterations to pipelines, cables, and any other facilities necessary for the construction of the project;
- (c) Hold and save the United States free from damages due to the proposed construction and future maintenance.

WILLIAM H. LEWIS,
Colonel, Corps of Engineers,
District Engineer.

[1st endorsement]

VICKSBURG, MISS., May 22, 1957.

To: The Chief of Engineers, Department of the Army, Washington, D.C.
From: Office, Division Engineer, U.S. Army Engineer Division, Lower Mississippi Valley, Corps of Engineers.
Subject: Survey report on Bayou Lafourche, La., and Lafourche-Jump Waterway, La. (New Orleans District report, Dec. 20, 1956.)

I concur in the recommendations of the District Engineer.

JOHN R. HARDIN,
Major General, U.S. Army,
Division Engineer.

APPENDIX D.—LETTER FROM U.S. COAST GUARD

U.S. COAST GUARD,
New Orleans, La., May 10, 1951.

The DISTRICT ENGINEER,
New Orleans District, Corps of Engineers,
New Orleans, La.

DEAR SIR: Reference is made to your letter of April 24, 1951, file LMNGO, on the subject of improvement of Bayou Lafourche, La., in the interest of navigation, and requesting the comments of this Office upon the feasibility and cost of establishment by the Coast Guard of suitable aids to navigation along the proposed improvement.

It is felt that the establishing of three lights on shore along with the relocation of Belle Pass Light, presently marking the jetty at Belle Pass, will suffice. The proposed approximate position of these aids has been indicated on the enclosed photostat.¹ It will be noted that one light will mark the bifurcation of the new channel with Bayou Lafourche, one will mark the entrance to the channel leading to Golden Meadow, and one will mark the entrance to the new channel from the Gulf Intracoastal Waterway end. Belle Pass Light will be relocated to the seaward end of the jetty extended.

The estimated cost of construction, including illuminating equipment follows:

(a) 3 each 20-foot skeleton towers on mudsill foundations at \$1,900.....	\$5,700
(b) Relocating and rebuilding Belle Pass Light.....	5,000
Total estimated cost.....	10,700

The estimated cost of annual maintenance will be \$190 per year per light, with an estimated life of the lights 20 years.

It is requested that this Office be notified if this becomes an authorized project in order that funds may be procured from the Congress to establish aids to navigation.

By direction of the district commander.

Very truly yours,

J. J. HUTSON, Jr.,
Commander, U.S. Coast Guard,
Chief, Aids to Navigation Section.

APPENDIX E.—LETTER FROM OYSTER DEALERS & GROWERS ASSOCIATION, INC.

LOUISIANA OYSTER DEALERS &
GROWERS ASSOCIATION, INC.,
New Orleans, La., August 13, 1953.

CORPS OF ENGINEERS, U.S. ARMY,
Office of the District Engineer,
Foot of Prytania Street,
New Orleans, La.

GENTLEMEN: The board of directors of the Louisiana Oyster Dealers & Growers Association has instructed the undersigned to notify you that this association is opposed to the proposed dredging of a

¹ Not printed.

canal from Venice Jump to the Empire lock canal as the same would constitute a hazard to navigation and would cause destruction of thousands of sacks of oysters in this area; unless adequate control measures such as locks are employed at the south end of said proposed canal at or near the Venice Jump.

We respectfully request that this protest be noticed and this association be granted an opportunity to present more detailed and specific reasons for this protest.

Trust that a convenient date can be arranged for a conference, we are,

Yours very truly,

(Mrs.) ENA D. WRENN,
Executive Secretary.

Office closed from August 14 thru 31. Notify our president Mr. Joseph Jurisich, Ma. 2651, if a conference is desired during this time.

[Note added:] (Conference held in New Orleans District Office on May 17, 1955.)

APPENDIX F.—REPORT OF U.S. FISH AND WILDLIFE SERVICE

DEPARTMENT OF THE INTERIOR,
FISH AND WILDLIFE SERVICE,
Atlanta, Ga., March 25, 1953.

DISTRICT ENGINEER,
Corps of Engineers, U.S. Army,
New Orleans, La.

DEAR SIR: This letter presents the preliminary comments of the U.S. Fish and Wildlife Service regarding the proposed navigation project for Bayou Lafourche and other streams in southern Louisiana. Remarks have been correlated with information contained in your notice of public hearing, held at Golden Meadow, La., on January 17, 1953; and with your preliminary reports on Bayou Lafourche and Lafourche-Jump Waterway.

DESCRIPTION OF PROJECT AREA

The region to be traversed by the proposed waterways extends from Larose southward and along Bayou Lafourche to the Gulf of Mexico, and from Leeville on Bayou Lafourche roughly paralleling the coast east to the Mississippi River at the Jump near Venice. Except along the natural levees of the alluvial streams, the area is coastal marsh and open water. Ground elevations vary from about 7 feet above mean sea level at Larose to only a few inches above mean sea level in the lower marshes. Many streams, lakes, bays, and artificially-constructed navigation canals comprise the complex system of waterways in the coastal marshes. Formerly some of the streams received water from the Mississippi River but levee construction has eliminated this source of inflow.

Higher grounds adjacent to Bayou Lafourche and the Mississippi River are intensively cultivated, and the principal crops are sugar cane and vegetables. Raising of beef cattle is of increasing importance. Harvest of fish and wildlife resources, principally shrimp, oysters,

fresh water and marine fishes, and fur animals adds greatly to the local economy. Oil, gas, and sulfur are important mineral resources. Industrial development is closely associated with marine, mineral, and agricultural products of the area.

Fish and wildlife resources are abundant in the marshes and waters along Bayou Lafourche and west of the bayou in the tract south of Larose to the gulf. Also, these resources are present in varying quantities in the marshes and waters roughly paralleling the coast between Bayou Lafourche and the Mississippi River to the east. While these areas as a whole are of general importance to fish and wildlife, certain tracts within the region are particularly productive.

Commercial fish, both marine and fresh water, are taken in large quantities from the area. The fresh water reaches of Bayou Lafourche Grand Bayou Blue, and connecting streams and lakes, provide good habitat for marketable fish. Catfishes are the principal species taken. Sport fishing for catfishes, black bass, and sunfishes is productive in these waters. Frogs and crayfish are harvested in quantity for private and commercial use. The principal fishery value of the region, however, comes from the aquatic forms associated with the brackish and salt water zones. Shrimps, oysters, and many species of fish are either harvested directly from these "inside" waters or spend a critical part of their life cycle there. Use of the brackish bays, bayous, and lakes as nursery and spawning grounds by marine forms important to the commercial and sport fishery is great.

Fur animal and waterfowl habitat is of outstanding quality in some of the favored areas of the region. Muskrats, minks, otters, and nutria are the most important species in the present fur harvest. Raccoons are numerous in nearly all areas of the marshes, but are not taken in large numbers due to their low pelt value. During the winter waterfowl are abundant in several sections within the project area and a moderately high population is maintained throughout the region.

EFFECTS OF PROJECT ON FISH AND WILDLIFE RESOURCES

Construction of an alternate navigation canal paralleling Bayou Lafourche from Larose to Leeville, maintenance of Bayou Lafourche from Larose to Leeville, and enlargement and maintenance of the bayou from Leeville to the mouth of the Mississippi River would detrimentally affect fish and wildlife habitat throughout the area. Utilization, as proposed, of Grand Bayou Blue as the general route of the alternate navigation channel would endanger the highly productive fresh and brackish marshes through which it would pass. In this area extensive salt water intrusion into waterfowl and fur animal habitat of high value would probably occur. The tortuous and semi-choked bayous in this area, especially above the latitude of Golden Meadow, tend to prevent the inrush of saline waters into the marshes during normal high tides in the gulf, and, at the same time restrain the drainage of fresh water from the marshes. In the event Grand Bayou Blue is straightened and enlarged as a part of the project, exchange of water between the gulf and adjacent marshes would be greatly encouraged. Ingress of salt water would be further aided by enlargement and maintenance of Bayou Lafourche below Leesville and the probable construction of lateral canals from the alternate navigation channel into the marsh proper by oil and sulfur interests.

Fresh water fisheries of Grand Bayou Blue and Bayou Lafourche would suffer from construction and maintenance operations. Turbidity, alteration of habitat, and sedimentation accompanying dredging activities would reduce fish populations in affected waters for a period of several years. In the lower extreme of Grand Bayou Blue numerous oysterbeds would be directly in the path of the new channel and would probably be destroyed or severely damaged by dredging operations. Spawning and nursery grounds of marine species would be adversely affected by siltation and sedimentation in the brackish reaches of Grand Bayou Blue and Bayou Lafourche.

Construction of the Lafourche-Jump Waterway from Leeville on Bayou Lafourche to the Jump on the Mississippi River would affect areas valuable to both fish and wildlife. Brackish and fresh marshes at either end of the waterway could be subjected to salt water intrusion by virtue of flow through the new channel. The head of fresh water provided by the Mississippi River at the eastern outlet would provide some protection from salt water intrusion at that extremity of the new canal. The marshes in the vicinity of Caminada Bay and easterly to approximately the parallel of Buras are of moderate wildlife value. Generally, the interior of the land areas is moderately to highly productive as waterfowl and fur animal habitat, but this production decreases in the proximity of highly saline water bodies.

In Caminada Bay, Barataria Bay, and other large water bodies of the region, oysters, shrimp, and marine fishes are abundant. Construction of the navigation channel through waters in this area could seriously affect these resources by actual destruction of habitat or by siltation. The principal loss to fishery resources of these areas would be occasioned by channel excavation in or near the existing valuable oyster grounds. Temporary deleterious effects upon the nursery and spawning grounds of other important marine forms would occur through turbidity and sedimentation resulting from dredging operations.

SUGGESTED MEASURES FOR AMELIORATING ADVERSE EFFECTS ON FISH AND WILDLIFE

Means of preventing salt water intrusion into productive marsh areas should be given primary consideration in project planning. Many thousands of acres of productive fur animal and waterfowl habitat in the Grand Bayou Blue area could be eliminated or seriously reduced in value if proper protective measures are not incorporated into the project design. As salt water control in the alternate navigation channel from Larose to Leeville seems impracticable, an alternate route to that proposed by the planning agency would be desirable. The most effective plan for prevention of salt water intrusion would embrace the following measures:

- (a) The alternate navigation channel would follow the 40-acre line from Larose to immediately below Golden Meadow, uniting with Bayou Lafourche at that point;
- (b) The construction of a salt water control structure near the lower end of the alternate navigation channel described in "(a)" above;
- (c) Enlargement and maintenance of Bayou Lafourche from Golden Meadow to the gulf.

Routing of the channel as described and construction and operation of the control structure would lessen the degree of salt water intrusion into the valuable Grand Bayou Blue marshes and fresh water areas. In addition, several oysterbeds in Grand Bayou Blue near Lake Racourci would not be damaged; and other fishery resources of Grand Bayou Blue throughout its length would not be harmed.

The route to be used in construction of the waterway from Leeville to the Jump could also be modified to prevent damage to fish and wildlife habitat. Routing of the channel in open water should be done with a thorough knowledge of the distribution of oyster-producing grounds. These grounds should be bypassed at a distance sufficient to prevent damage by excavation or sedimentation. In reaches where the waterway must pass through large land masses, features designed to alleviate possible salt water intrusion should be made a part of the plan. The channel would be least detrimental if it were routed to pass through areas already subject to high salinities. In effect, this would generally mean that land cuts be made as close to the shoreline of saline water bodies as practicable. Spoil deposition from the excavation could be beneficially utilized if it were placed as a continuous levee on the landward side of the cut. These two complementary measures would serve to prevent salt water intrusion into fresh marsh areas, as well as impound fresh water behind the levee. Such impoundment would provide desirable wintering habitat for waterfowl and provide benefits to fish and some fur animals.

The Fish and Wildlife Service, in cooperation with the Louisiana Department of Wild Life and Fisheries, would be pleased to assist the planning agency in field studies to establish routes for new channels, utilization of spoil, and other measures that would serve the designed purpose of the project, and reduce losses to fish and wildlife expected from the project as presently planned.

The opportunity to comment on this project and the field assistance of Mr. William Shell of your staff are appreciated.

Very truly yours,

WALTER A. GRESH,
Acting Regional Director.

APPENDIX G. REPORT OF THE U.S. FISH AND WILDLIFE SERVICE

U.S. DEPARTMENT OF THE INTERIOR,
FISH AND WILDLIFE SERVICE,
OFFICE OF THE REGIONAL DIRECTOR,
Atlanta, Ga., February 10, 1954.

DISTRICT ENGINEER,
Corps of Engineers, U.S. Army,
New Orleans, La.

DEAR SIR: This letter was prepared pursuant to Mr. George H. Hudson's letter request of October 12, 1953, and presents revised comments of the U.S. Fish and Wildlife Service regarding the proposed navigation project for Bayou Lafourche and other streams in southern Louisiana. Remarks have been correlated with information contained in your notice of public hearing, held at Golden Meadow, La., on January 17, 1953; and with your preliminary reports on Bayou Lafourche and Lafourche-Jump Waterway. Recent additional in-

formation received from representatives of your organization have been incorporated.

DESCRIPTION OF PROJECT AREA

The region to be traversed by the proposed waterway extends from Larose southward and along Bayou Lafourche to the Gulf of Mexico. Except along the natural levees of the alluvial streams, the area is coastal marsh and open water. Ground elevations vary from about 7 feet above mean sea level at Larose to only a few inches above mean sea level in the lower marshes. Many streams, lakes, bays, and artificially constructed navigation canals comprise the complex system of waterways in the coastal marshes. Formerly some of the streams received water from the Mississippi River, but levee construction has eliminated this source of inflow.

Higher grounds adjacent to Bayou Lafourche and the Mississippi River are intensively cultivated, and the principal crops are sugarcane and vegetables. Raising of beef cattle is of increasing importance. Harvest of fish and wildlife resources, principally shrimp, oysters, fresh-water and marine fishes, and fur animals adds greatly to the local economy. Oil, gas, and sulfur are important mineral resources. Industrial development is closely associated with marine, mineral, and agricultural products of the area.

Fish and wildlife resources are abundant in the marshes and waters along Bayou Lafourche and west of the bayou in the tract south of Larose to the gulf. While this area as a whole is of general importance to fish and wildlife, certain tracts within the region are particularly productive.

Commercial fish, both marine and fresh water, are taken in large quantities from the area. The fresh-water reaches of Bayou Lafourche, Grand Bayou Blue, and connecting streams and lakes, provide good habitat for marketable fish. Catfishes are the principal species taken. Sport fishing for catfish, black bass, and sunfish is productive in these waters. Frogs and crayfish are harvested in quantity for private and commercial use. The principal fishery value of the region, however, comes from the aquatic forms associated with the brackish and salt-water zones. Shrimps, oysters, and many species of fish are either harvested directly from these "inside" waters or spend a critical part of their life cycle there. Use of the brackish bays, bayous, and lakes as nursery and spawning grounds by marine forms important to the commercial and sport fishery is great.

Fur-animal and water fowl habitat is of outstanding quality in some of the favored areas of the region. Muskrats, minks, otters, and nutria are the most important species in the present fur harvest. Raccoons are numerous in nearly all areas of the marshes, but are not taken in large numbers due to their low pelt value. During the winter waterfowl are abundant in several sections within the project area and a moderately high population is maintained throughout the region.

EFFECTS OF PROJECT ON FISH AND WILDLIFE RESOURCES

Construction of an alternate navigation canal paralleling Bayou Lafourche from Larose to Leeville, maintenance of Bayou Lafourche from Larose to Leeville, and enlargement and maintenance of the

bayou from Leeville to its mouth at the Gulf of Mexico would detrimentally affect fish and wildlife habitat throughout the area. Utilization, as proposed, of Grand Bayou Blue as the general route of the alternate navigation channel would endanger the highly productive fish and brackish marshes through which it would pass. In this area extensive salt-water intrusion into waterfowl and fur-animal habitat of high value would probably occur. The tortuous and semichoked bayous in this area, especially above the latitude of Golden Meadow, tend to prevent the inrush of saline waters into the marshes during normal high tides in the gulf, and, at the same time, restrain the drainage of fresh water from the marshes. In the event Grand Bayou Blue is straightened and enlarged as a part of the project, exchange of water between the gulf and adjacent marshes would be greatly encouraged. Ingress of salt water would be further aided by enlargement and maintenance of Bayou Lafourche below Leeville and the probable construction of lateral canals from the alternate navigation channel into the marsh proper by oil and sulfur interests.

Fresh-water fisheries of Grand Bayou Blue and Bayou Lafourche would suffer from construction and maintenance operations. Turbidity, alteration of habitat, and sedimentation accompanying dredging activities would reduce fish populations in affected waters for a period of several years. In the lower extreme of Grand Bayou Blue numerous oyster beds would be directly in the path of the new channel and would probably be destroyed or severely damaged by dredging operations. Spawning and nursery grounds of marine aquatic forms would be adversely affected by siltation and sedimentation in the brackish reaches of Grand Bayou Blue and Bayou Lafourche. The elimination of the originally proposed channel from the vicinity of Leeville to the Jump near the mouth of the Mississippi River would significantly reduce the deleterious effects on fish and wildlife that would have resulted from the plan to embrace that segment of channel.

SUGGESTED MEASURES FOR AMELIORATING ADVERSE EFFECTS ON FISH AND WILDLIFE

Means of preventing salt-water intrusion into productive marsh areas should be given primary consideration in project planning. Many thousands of acres of productive fur-animal and waterfowl habitat in the Grand Bayou Blue area could be eliminated or seriously reduced in value if proper protective measures are not incorporated into the project design. As salt-water control in the alternate navigation channel from Larose to Leeville seems impracticable, an alternate route to that proposed by the planning agency would be desirable. The most effective plan for prevention of salt-water intrusion would embrace the following measures:

- (a) The alternate navigation channel would follow the 40-arpent line from Larose to immediately below Golden Meadow, uniting with Bayou Lafourche at that point;
- (b) The construction of a salt-water control structure near the lower end of the alternate navigation channel described in (a) above;
- (c) Enlargement and maintenance of Bayou Lafourche from Golden Meadow to the gulf.

Routing of the channel as described and construction and operation of the control structure would lessen the degree of salt-water intrusion into the valuable Grand Bayou Blue marshes and fresh-water areas. In addition, several oyster beds in Grand Bayou Blue near Lake Raccourci would not be damaged, and other fishery resources of Grand Bayou Blue throughout its length would not be harmed.

The Fish and Wildlife Service, in cooperation with the Louisiana Wild Life and Fisheries Commission, requests the opportunity to assist the planning agency in field studies to establish routes for new channels, utilization of spoil, and other measures that would serve the designed purpose of the project and yet reduce losses to fish and wildlife expected from the project as presently planned.

Very truly yours,

WALTER A. GRESH,
Regional Director.

APPENDIX H. STATEMENT OF LOUISIANA WILD LIFE AND FISHERIES COMMISSION

STATEMENT OF THE LOUISIANA WILD LIFE AND FISHERIES COMMISSION for the survey report of the district engineer, New Orleans district, Corps of Engineers, covering the proposed improvement of Bayou Lafourche, La., and the Lafourche-Jump Waterway, La., June 20, 1955

This statement by the Louisiana Wild Life and Fisheries Commission has been prepared for the district engineer, New Orleans district, Corps of Engineers, as requested by letter, dated May 19, 1955, to be included with the survey report of this district now nearing completion which will be fully coordinated with all interested agencies. This report will cover the proposed improvement of Bayou Lafourche, La., and the Lafourche-Jump Waterway.

The locations of the projects were shown on a map and the following description was given:

The auxiliary channel to the west of Bayou Lafourche which extends from just below Leeville to the Intracoastal Waterway is a proposed 12- by 125-foot channel; Bayou Lafourche from the point where the auxiliary channel connects with it to the Gulf of Mexico is a proposed 9- by 100-foot channel; while Bayou Lafourche from Leeville to the Intracoastal Waterway at Larose is a proposed 9- by 60-foot channel. The Lafourche-Jump Waterway which extends easterly from Bayou Lafourche at Leeville to the Mississippi River at the Jump is a proposed 12- by 125-foot waterway.

The proposed projects would have various effects on the fish and wildlife resources of the areas under consideration ranging from low or moderate to substantial, depending upon the specific project area. These four segments have been reviewed from the aspect of immediate as well as possible long-range effects on these resources while keeping in mind needs for other developments and interests in these areas.

Economic values of fish and wildlife resources have been indicated as being of considerable importance in two previous statements by the Fish and Wildlife Service dated March 28, 1953, and February 10, 1954. The Commission concurs in the relative values established therein. In order to submit additional information, these four segments will be discussed under two headings. The improvements asso-

ciated with Bayou Lafourche will be treated under one, while the Lafourche-Jump Waterway will be handled separately.

1. *Improvement of Bayou Lafourche, La.*—The Commission concurs in the appraisal of the three segments included here by the Fish and Wildlife Service statement, dated February 10, 1954. We also approve and recommend adoption of their suggested modifications for ameliorating adverse effects on fish and wildlife. It is also thought that such a location of the auxiliary channel as proposed by them would provide additional freshwater to Grand Bayou Blue via the many bayous leading into it which will very likely be cut or crossed by this channel. Provided a salt-water control structure is placed near the lower end of this alternate channel, this project should enhance the fishery values of Grand Bayou Blue and accordingly should be shown as one of the benefits associated with the project. At this time, we are unable to estimate the potential enhancement value.

2. *The Lafourche-Jump Waterway, La.*—This project presents a number of problems which would have various effects on the fish and wildlife resources of the surrounding area which would result from ecological changes. As previously indicated, there exist valuable fisheries which conceivably could be seriously affected. There is little doubt that substantial losses would occur immediately to the oyster industry within the project area during construction. For instance, along the proposed channel route and within a 3-mile border on either side, where applicable, there are presently 721 leases totaling 8,310 acres of productive oyster grounds. In addition, oyster, shrimp, and marine fishes, which are abundant in the brackish waters of these bodies of water to be traversed by this proposed channel, could be seriously affected by an actual loss of habitat or as a result of increased turbidity and siltation. The effects of these results would probably be projected on the nursery and spawning grounds of other important marine forms for an undetermined period. Waterfowl and fur-bearer values of this area range from low to good depending upon environmental conditions—along the sea rim where high salinities exist, values for these wildlife forms are generally low, but increase as the habitat improves.

Salt water intrusion into brackish and fresh water areas is another aspect of considerable concern to us. It would appear that this is one of the potential problems confronting us on each end of this proposed waterway. Provided a sustained flow of fresh water could be maintained from the Mississippi River at all times, some restriction of salt water intrusion would occur. This could be beneficial to the oyster fishery in adjacent westerly areas. However, it is well known that the river, during periods of low flow, becomes salty for considerable distances above the Head-of-Passes. Hence, an unstable water condition would occur which would have serious effects on the marsh country from the Jump to Bay Tambour. Salinity fluctuations and expected muddy waters would be highly unfavorable to the general ecology of the area.

Features of this and similar projects preclude detailed analyses of their immediate and long-range effects on wildlife and fishery resources in the project area as well as those areas influenced by the project. We must be provided by the planning agency with adequate hydrographic data dealing with the probable expected changes in existing currents, water fluctuation, salinities, and siltation, as a result

of the project. With information such as this and a knowledge of the ecology of the area involved, more accurate estimates of benefits and losses can be made. Therefore, only a general appraisal can be made until more detailed information is available.

In recognition of the importance of wildlife and fishery resources of this project area, both economic and otherwise, the Louisiana Wild Life and Fisheries Commission, convened in a regular meeting in Houma, La., on May 24, 1955, voted unanimously to oppose this Lafourche-Jump Waterway project until such time that information has been obtained which shows no detrimental effects or that modification can be included which will prevent losses from occurring. At that time, this project can be reconsidered by the commission.

We will be glad to work with the Fish and Wildlife Service in cooperation with all interested agencies in the detailed studies or evaluations of these two projects or their segments now being considered in this survey report if further studies are feasible.

APPENDIX I.—RESOLUTION OF THE PLAQUEMINES PARISH POLICE JURY

RESOLUTION

Whereas this police jury is in receipt of a letter from Col. C. T. Tench, District Engineer, New Orleans District, Corps of Engineers, U.S. Army, advising that his office is engaged in preparing a survey report covering the Lafourche-Jump Waterway, and that one of the requirements of local cooperation for a navigation project of this type is that "necessary rights-of-way be furnished free of cost to the United States by the local governing body, or the police jury": Therefore, be it

Resolved by the Plaquemines Parish police jury, That considering the most expensive and unsatisfactory experience of this police jury, as local governing body of the Parish of Plaquemines, sponsoring the furnishing of rights-of-way, etc., for the construction of the extension of the Intracoastal Canal through the upper portion of Plaquemines Parish, from Bayou Barataria to the Mississippi River below Algiers, that this police jury does not care to assume any further obligation with the U.S. Government Engineers in sponsoring any such project involving the furnishing of rights-of-way and other similar operations to be assumed by this police jury; and be it further

Resolved, That five certified copies of this resolution be forwarded to the U.S. District Engineers, New Orleans District, attention Col. C. T. Tench.

I hereby certify the above and foregoing to be a true and correct copy of a resolution adopted by the Plaquemines Parish police jury, at a meeting held at Pointe-a-Hache, La., on Tuesday, June 16, 1953.

E. LAFRANCE, *Secretary.*

APPENDIX J.—RESOLUTION OF JEFFERSON PARISH POLICE JURY

On motion of Mr. Ludwig, seconded by Mr. Nunez, the following resolution was offered:

RESOLUTION

Whereas the U.S. Corps of Engineers, New Orleans District, are now working on a plan of improvement of the Lafourche-Jump Waterway and other streams of Louisiana, and

Whereas the police jury of Jefferson Parish has passed a resolution indicating their willingness to give local support by agreeing to furnish the necessary rights-of-way for that portion of the Lafourche-Jump Waterway that traverses Jefferson Parish, and

Whereas said waterway would shorten the present shipping route by 50 percent and eliminate the extremely dangerous and hazardous route in the open Gulf of Mexico, making an all-weather route available, which did not formerly exist, and

Whereas it would mean inestimable savings in the cost of shipping the tremendous movements of sulfur and oil found in this area, and would be a great help to the shrimp, oyster, and fishing industry in general: Now, therefore, be it

Resolved by the police jury of the parish of Jefferson, State of Louisiana, That this police jury does hereby recommend to the U.S. Engineers that they do their utmost to expedite the construction of the proposed Inland Waterway Cut from the Jump at the Mississippi River in Plaquemines Parish to Bayou Lafourche in Lafourche Parish; and be it further

Resolved, That the police juries of Lafourche and Plaquemine Parishes be urged to take similar action, and that copies of this resolution be forwarded to Lafourche Parish police jury, Plaquemines Parish police jury, Senator Allen Ellender, Senator Russell B. Long, Representative Edward Willis, Representative Hale Boggs, Representative F. Edward Hébert and the Freeport Sulphur Co., urging each and every one of them to lend every effort to speed up and expedite the construction of said Lafourche-Jump Waterway.

Rollcall on the adoption of the foregoing resolution resulted as follows:

Yeas: Strehle, Breaux, Falcon, Pertuit, Berthelot, Nunez, Barrus, Ottermann Hall, Reviere, Fitzgerald, Ladnier, LeBlanc, Ludwig, and Holtgreve.

Nays: None.

Absent: Stone and Giardina.

The resolution was declared to be adopted this the 12th day of May 1953.

I, Frank J. Deemer, secretary of the police jury, parish of Jefferson, State of Louisiana, do hereby certify that the above is a true and correct copy of a resolution adopted by the police jury, parish of Jefferson, State of Louisiana, on the 12th day of May 1953, in special session assembled.

FRANK J. DEEMER,
Secretary, Police Jury, Parish of Jefferson.

APPENDIX K.—LETTER FROM DEPARTMENT OF PUBLIC WORKS,
STATE OF LOUISIANASTATE OF LOUISIANA,
DEPARTMENT OF PUBLIC WORKS,
Baton Rouge, September 30, 1955.

Col. WILLIAM H. LEWIS,
U.S. Army, District Engineer, New Orleans District,
New Orleans, La.

DEAR COLONEL LEWIS: On September 13, 1954, we wrote your office in regard to the Bayou Lafourche navigation project stating the local assurances which would be furnished by the Bayou Lafourche Parish police jury and the department of public works.

At that time we informed you that the Lafourche Parish police jury would provide the necessary rights-of-way and arrange for the alteration of pipelines, cables, and other facilities which might be necessary because of the project. Since that time, we have been informed by your office that additional rights-of-way will be required and we are, at this time, negotiating with the right-of-way committee of the Lafourche Parish police jury for assurances on the revised right-of-way requirements. In our letter of September 13, the department of public works agreed to dredge and maintain the 12 feet by 125 feet connection from Golden Meadow to the New Bayou Lafourche Navigation Canal at an estimated cost of \$168,000. At that time no assurance was given as to the construction of the pontoon bridge at Larose, La., inasmuch as it was thought to have been a Federal responsibility.

After considerable correspondence with your office in regard to the construction of the pontoon bridge near Larose, La., the Department of Public Works, because of the extremely meritorious character of the Bayou Lafourche navigation project, has decided to guarantee to construct the pontoon bridge at an estimated cost of \$153,000.

We hope that arrangements can be made for the maintenance and operation of this bridge, and that the assurances relative to the rights-of-way and the alteration of utilities will be forthcoming from the Lafourche Parish policy jury so that your report may be sent forward for approval by higher authority. We are very anxious that this report be approved by the Chief of Engineers and the Rivers and Harbors Board in time for consideration for authorization during the next session of Congress.

Yours very truly,

CALVIN T. WATTS, *Director.*

APPENDIX L.—LETTER FROM HIGHWAY DEPARTMENT, STATE OF LOUISIANA

STATE OF LOUISIANA,
DEPARTMENT OF HIGHWAYS,
Baton Rouge, October 17, 1955.

DISTRICT ENGINEER, CORPS OF ENGINEERS,
New Orleans, La.

DEAR SIR: I am in receipt of your letter of October 11, 1955, with reference to maintenance of the proposed pontoon bridge on State Route 124 (new) in Lafourche Parish.

This is to advise that we will assume the maintenance and operation of this pontoon bridge when it has been constructed by the department of public works.

Yours very truly,

GEORGE S. COVERT, Director.

APPENDIX M.—RESOLUTION OF THE LAFOURCHE PARISH POLICE JURY

RESOLUTION

Be it resolved by the police jury of the parish of Lafourche, State of Louisiana, acting as governing authority of said parish, That this police jury hereby endorses the project for Bayou Lafourche consisting of improvement of Bayou Lafourche from Golden Meadow to the gulf, construction of a bypass channel from Leeville to Larose, and construction of the connecting channel from Leeville to Barataria Pass. The said police jury does assure the United States that it agrees to furnish the necessary local cooperation to secure rights-of-way necessary for the project as and when required.

The foregoing resolution having been submitted to a vote, the vote thereon was as follows:

Yeas: Legendre, Naquin, David Barker, Bouterie, Lococo, Rodriguez, Borne, Dufrene, T. M. Barker, Bernard, Chouest, Loviere, Sr.

Nays: None.

Absent: Uzee, Thibodaux, Levert, Jr.

The resolution was declared to be adopted this the 8th day of August 1956.

IRVING E. LEGENDRE,
President.

G. G. ZIMMERMAN,
Secretary.

I, G. G. Zimmerman, secretary of the police jury, parish of Lafourche, State of Louisiana, do hereby certify that the above is a true and correct copy of a resolution adopted by the police jury, parish of Lafourche, State of Louisiana, on the 8th day of August 1956 in regular session assembled.

G. G. ZIMMERMAN,
Secretary, Lafourche Parish Police Jury.



